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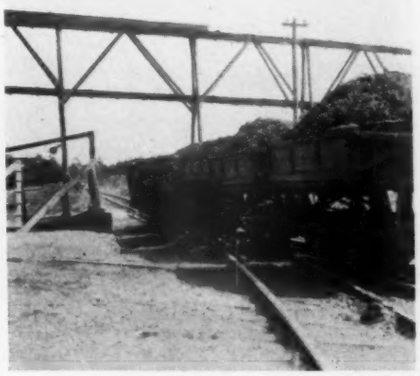
Sand and Gravel Dry Excavated Pumped to Top of Plant

Gifford-Hill and Company's Plant at Trout, Louisiana, Has Dragline Excavators, Railway Transportation from Pit to Plant, but Material Is Pumped to Screens

A VERY GOOD illustration of the truth of the saying that the type of sand and gravel operation must be adapted to the deposit and the material is the new Trout, La., plant of Gifford-Hill and Co., Inc. This organization has had much experience with sand and gravel production in the neighboring state of Texas.

The Trout plant is roughly 50 miles north of Alexandria (by highway) on the Louisiana and Arkansas railroad, and it is the only washed gravel plant of any size in the immediate territory. Several pit operations shipping clay-gravel are in this district, however. The plant has a capacity of 25 cars of gravel per 10-hr. day.

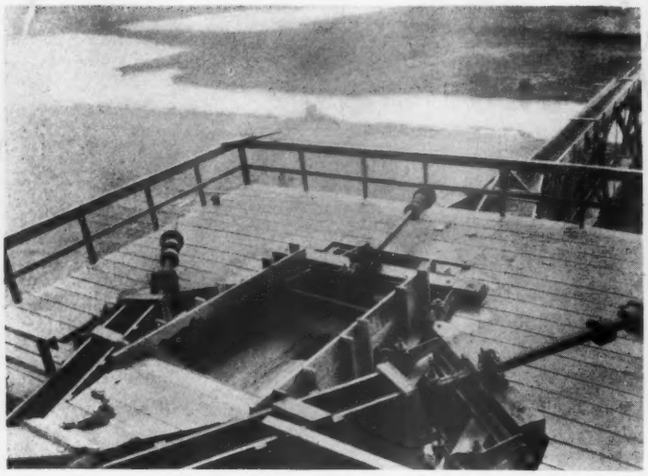
The sand and gravel from the pit is recovered by the use of a 3-yd. Monighan walking dragline driven by a 120-hp. Fairbanks-Morse Deisel engine and a 1-yd. Northwest gasoline-engine driven dragline. The larger dragline does most of the loading. The draglines load to 4-yd. Western cars that are hauled to the plant in trains of six cars each by one of three 12-ton Plymouth gasoline locomotives over a 36-in. gage track, that at present is roughly one-half mile long. The company has about 30 dump cars for this operation.



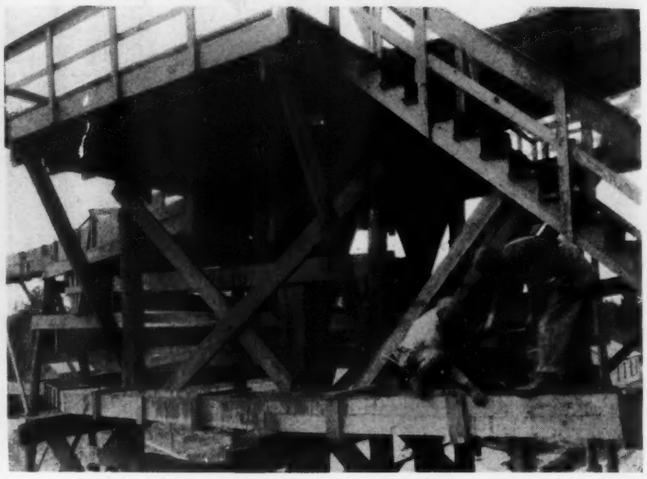
Cars delivering material to sump

The cars on arriving at the plant are dumped to a sump from which the material is pumped to the top of the plant by a 10-in. Bennett pump, driven by a 200-hp. Westinghouse induction motor through a Dayton "Cog Belt" drive. The rotary screen also is driven through this type of drive. As the

"Walking" dragline, Diesel-engine-driven, excavates material



Large cone, center, recovers coarse material; smaller cones, each side, recover finer sand



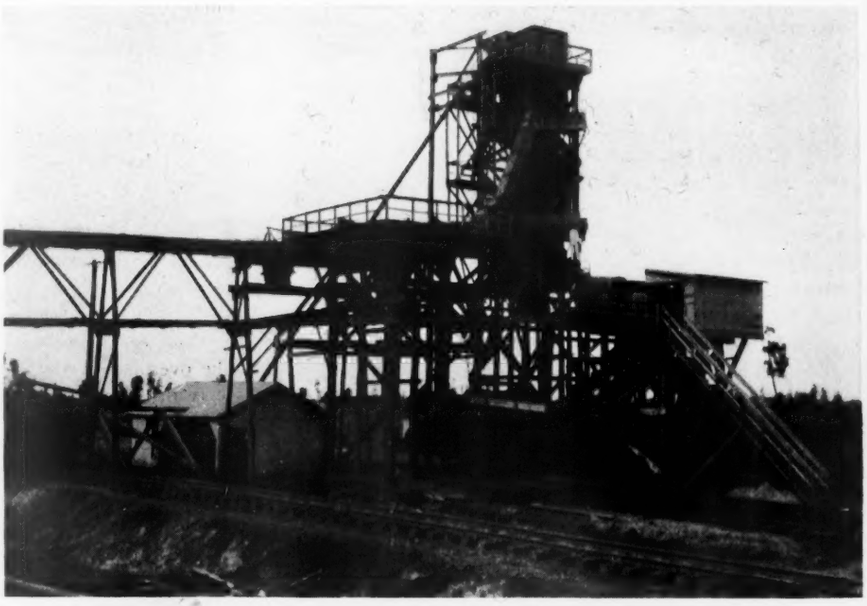
The three cone separators as seen from below the operating platform

storage space in the sump is small, to assist the disintegration of any clay present, jets of water impinge against the material as it is dumped from the cars to the sump, breaking down some of the clay particles and spreading the gravel over the floor of the sump and closer to the pump's suction.

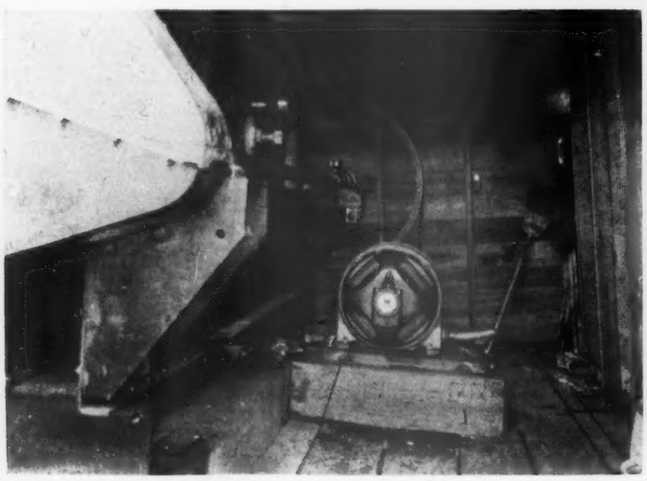
The pump delivers to the top of the plant a total height of 70 ft., where the pipe line discharges over a spreading table that delivers to three stationary screens arranged in a single cascade. Each one of these screens is 6 ft. wide by 14 ft. long and provided with ¼-in. slotted wire cloth. Fresh water is sprayed on these screens.

The overside from the stationary screens is then chuted to a 48-in. by 24-ft. Telsmith rotary screen, which also is provided with sprays of fresh water, and makes two sizes of gravel primarily, a pea gravel and concrete gravel. These are chuted direct to cars, as the plant does not have any bin storage space provided. The plant is of wood construction.

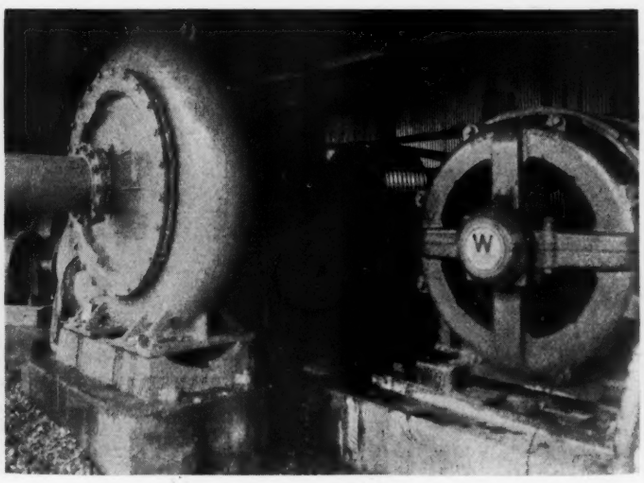
The sand passing through the stationary screens goes to a spreading table that serves three Link-Belt sand cones; the arrangement



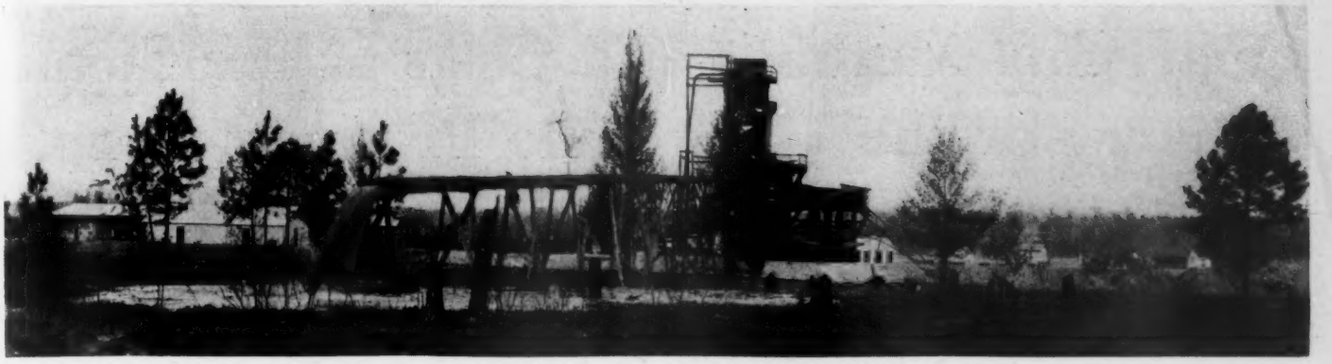
The lower structure houses the stationary screens The rotary screen discharges direct to cars



Rotary screen driven by individual motor and V-belt



The 10-in. pump with motor and V-belt drive



General view of plant showing launder discharge to settling pond

of these cones is quite novel. They are arranged in a single row with an 8-ft. cone in the center and a 4-ft. cone on each side. The tops of the cones are all at the same elevation. The two outer cones will supply the fine sand and the inside cone the concrete sand.

The basic idea of this arrangement is that the water coming over the spreading table has a greater velocity at the center than near the edges and hence the center of the stream will carry the coarse sands and the water at the edge, being of slower velocity, will carry the finer material only. No screens are used to make the separation between the concrete and finer sand, the operators depending upon the velocity of the water over the spreading table to make the separation.

Water for washing is supplied from a lake about 4000 ft. from the washer. This lake is about 5 ft. higher than the ground line at the plant, hence a 25-hp. Westinghouse motor direct-connected to an "Economy" pump is sufficient to lift the water to the top of the plant. The pump has a 6-in. suction and a 5-in. discharge. As an auxiliary water supply a second similar pumping unit is located immediately alongside of the plant, taking its supply from a small pond that has water in it during most of the operating season.

Three lines of standard-gage switch track pass through the plant, all lines being properly graded so that empties and loads can be dropped to and away from the plant by gravity. The company have a 55-ton Baldwin steam locomotive for other switching purposes.

The company has sunk prospect holes throughout the deposit and has proven the presence of at least 2,000,000 cu. yd. of gravel, which extends in depths up to 54 ft. The bank runs higher in gravel than most of the Louisiana deposits having roughly 65%, all of which is comparatively small sized. Some overburden is present. Clay is also associated with the gravel, especially with the portions next to the overburden, but the material balls up quite readily and the oversize from the rotary screen accounts for practically all clay that reaches the washer.

The plant was designed by J. W. Higgs, chief engineer of Gifford-Hill and Co., Inc., Dallas, Tex. J. Howard Wilson is superintendent; T. O. Griffin, general foreman. W. M. Milton, electrical engineer, had charge of the construction work. The general offices of the company are in the Mercantile Bank Bldg., Dallas. P. W. Gifford is president; J. Rutledge Hill, vice-president; H. M. Lacy, treasurer; F. R. Gifford, general superintendent.

Plant office building

One-yard crawler crane rigged as dragline used for stripping operations

Claims Valuable Marble Deposit

JAMES R. WILLIAMS, of Detroit, Mich., an official of the Consolidated Marble Corp., owners of leases and options of the serpentine marble range five miles northwest of Ishpeming, recently stated that this range has the most valuable marble deposit in the world and that many marble operating companies are watching it with interest. He said in part:

"Twenty feet below the surface there is a very beautiful sound marble and five different kinds of marble exist on the range. We have the only verde antique deposit of its kind anywhere in the world, and marble men everywhere are interested in this project.—*Michigan Contractor and Builder.*

Mining Industry of Idaho

THE 33RD annual report of the mining industry of Idaho for the year 1931 has been issued by Stewart Campbell, inspector of mines. The report contains a brief summary of all activities of the state, by counties. A detailed report of operations is given.

Quarrying Methods and Costs at the Sloan Quarry of the U. S. Lime Products Corp.

By R. E. Tremoureux

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THE HIGH-CALCIUM LIMESTONE DEPOSIT was originally located about 1910. It was opened several years later to supply the lime requirements for the treatment of the gold and silver ores of Goldfield and Tonopah by the cyanide process. For many years the deposit was worked by the Nevada Lime and Rock Corp. Upon the decline of the Goldfield and Tonopah mining districts additional markets were sought, with the result that the Sloan quarry is the principal source of limestone used in the open-hearth steel furnaces and beet sugar industries of southern California.

The property was taken over by the United States Lime Products Corp. in June, 1927. The potential value of the dolomite deposits which occur above and below the limestone bed was overlooked until the present company acquired control. Early in 1928 investigation led to the erection of a kiln for calcining dolomite. The dolomitic lime met with such success that three kilns were installed to supply the demand for this product.

The shipping products are dolomitic and high-calcium lime hydrates, quicklime and crude limestone for use as a flux in the steel industries and also for the sugar refineries which calcine their own lime.

Geology

Little information has been published concerning the geology of the region in the vicinity of Sloan. The limestone and dolomite deposits occur as a detached mountain having an elevation of 1000 ft. above the desert plain or 3800 ft. above sea level. The base of the mountain covers an area of more than 1000 acres and the entire mass is commercial stone, in the proportion of 20% high-calcium limestone and 80% dolomite. The upper dolomite (See Fig. 1) is massive and rests conformably on a thick-bedded high-calcium limestone; the limestone bed in turn rests conformably on the lower dolomite, which is of the same type as the upper dolomite. The formations exposed in the mountain are probably of Carboniferous age. The upper dolomite has an average thickness of about 600 ft.; the limestone is about 180 ft. thick; the thickness of the lower dolomite has not been determined.

By referring to the idealized cross-sectional sketch of the quarry face, Fig. 1 (A), it will be observed that the limestone bed projects from the face of the mountain to form a steep cliff. This ledge of limestone extends along the face of the mountain for about a mile and is entirely free from overburden or vegetation. On top of the limestone ledge the dolomite forms a capping which covers the entire top of the mountain.

*Abstract from U. S. Bureau of Mines Information Circular 6599.

Editors' Note

THE INTERESTED reader will find an illustrated description of the Sloan quarry operation in Rock Products, April 26, 1930. Following that article in the same issue was a novel plan for getting out large daily tonnages of stone, proposed by John Mocine, general superintendent of the company, in case it was desired to use stone from this quarry for the Hoover dam construction.—The Editors.

Physical and Chemical Characteristics of the Stone

Both the high-calcium and dolomitic limestones are hard and dense. The limestone is traversed by fine seams which do not contain any foreign material. The seams are not prominent enough to cause sloughing, and with the dry climatic conditions which prevail at Sloan the quarry face can be kept almost vertical without danger. There is enough difference in the appearance of the two rocks to sort them readily while hand-loading, should any dolomite become mixed with the limestone. Both stones are remarkably uniform, so that no selective mining is necessary.

The average analyses of the two rocks are as follows:

Dolomite	Per cent.
$MgCO_3$	43.35
SiO_2	0.14
Fe_2O_3; Al_2O_3	0.37
$CaCO_3$	56.14
Total	100.00

Limestone	Per cent.
$MgCO_3$	1.72
SiO_2	0.72
Fe_2O_3; Al_2O_3	0.45
$CaCO_3$	97.11
Total	100.00

Variations in the impurities do not exceed 10% plus or minus the above percentages. There are no faults or other structural irregularities which have any influence on quarrying methods.

A number of compressive tests were made on 3-in. cubes of the limestone to determine its quality for concrete aggregate for the construction of the Boulder Canyon dam. The following results were obtained:

Direction of load to grain	Ultimate compressive strength, lb. per sq. in.
Perpendicular	13,550
Parallel	11,600

The average specific gravity of the limestone is 2.68 and of the dolomite is 2.63.

Sampling and Estimation of Tonnage

As the deposit is exposed, no prospecting is necessary.

No routine sampling is employed on the stone broken in the quarry. However, the company maintains a lime-plant control laboratory at Sloan and daily chemical and physical tests are made on the lime products in order to maintain standards of quality. Rock analyses are determined by calculating back the results obtained in the lime plant control tests, with an occasional direct analysis of the crude stone for the purpose of check. Lime-plant samples are taken with automatic samplers.

The amount of measurable stone on the property is in excess of 1,000,000,000 tons. This figure is arrived at by calculating the cubical contents of the deposit and dividing by the volume of 1 ton of rock in place. The tonnage factor employed is 13 cu. ft. for each ton of rock in place.

Choice of Method

The quarry floor is opened at the base of the high-calcium bed, and up to the present time the stone has been, and for many years to come will be, won by open quarry methods using the tunnel system of blasting. As no difficulty is experienced in shearing the high faces by the use of tunnel shots, this method is considered preferable to well drilling. The nature of the topography excludes the use of the latter without expensive road and bench cutting.

Quarrying Methods

General plans and sections of the quarry are shown in Figs. 1 and 2, together with

the location of the loading tracks, railroad facilities and general layout of the camp, crushing plant and lime kilns.

The crushing and lime-burning plant and shipping tracks are 175 ft. below the quarry floor, which permits of a gravity flow of the stone. As the former operators attacked only the high-calcium stratum, this bed has been worked back so far at one point that the overlying dolomite can be shot down direct so as to fall to the floor of the limestone quarry, making it unnecessary to maintain a second bench to quarry the dolomite. At a future date, when the high calcium bed has been worked back where it is entirely capped by the dolomite, it will be necessary to drive underground openings and mine the stone by a room-and-pillar method.

About one-half of the 300 tons of limestone quarried daily is shipped direct to steel or sugar mills. The general specification for size of this crude limestone is between 6- and 30-lb. pieces. The remainder, consisting largely of undersize material, is sent to the rotary kilns. The dolomite is also broken to 6- to 30-lb. pieces and sent to vertical kilns. The dolomite spalls are stockpiled for future use.

Drilling and Blasting

All primary blasting is done by the tunnel method. Plans of two tunnels and the weight of the loads used are given in Fig. 3. One of these tunnels, *A*, was driven for a corner or squaring-up shot in the dolomite above the limestone, and the other, *B*, for a small shot with a comparatively low face in the limestone. The usual vertical burden over the tunnels is about 180 ft.

The tunnels, which are approximately 3x 4½ ft. in section, are driven about 40 ft. at right angles to the face, and then powder drifts averaging 40 ft. long are driven in either direction parallel to the face. In drilling, a simple 7-hole round is employed comprising a 3-hole pyramid cut and four corner holes. All holes are drilled to a depth of 30 to 36 in. with a hand-held jackhammer, using 1-in. hexagonal steel with the ordinary cross bits. Air at 90 lb. pressure is furnished by a 9x8 in. single-stage compressor, driven by a distillate engine.

Each drill hole is loaded with three sticks of 40% strength gelatin dynamite ⅞-in. in diameter and 8 in. long. Blasting is done with No. 6 detonators attached to tape fuse. The broken rock is shoveled into wheelbarrows and removed to the tunnels portal for use as backfilling. The powder pockets at the end of the tunnel tees are sumped about 2 ft. Black powder is dumped from the cans at the ends of the tees, and 50 lb. of 40% strength gelatin dynamite is placed with each charge for a primer. The charge is covered with old burlap sacks and the powder pockets and entire tunnel backfilled with the broken rock obtained in driving the tunnel. In backfilling, rock walls are built up by hand at intervals of 5 to 8 ft. and the spaces in between the walls are filled with fine broken rock. Any ground which is fissured or cracked is tightly packed with sacks to prevent dissipation of the explosive energy. Electric delay detonators are used to fire the charges. The duplex lead wires are reinforced by winding them with strips of burlap and tape. Charges are fired with a hand-operated blasting machine. The blasting duty ranged from a minimum of 2½ tons per pound of powder up to a maximum of 16 tons per pound where favorable conditions prevail, such as a steep face with overhang.

Owing to the height of the face, it is seldom necessary to shoot over two coyote holes at the same time, and usually one tunnel shot will yield sufficient stone. The average duty in blasting is 6 tons of broken

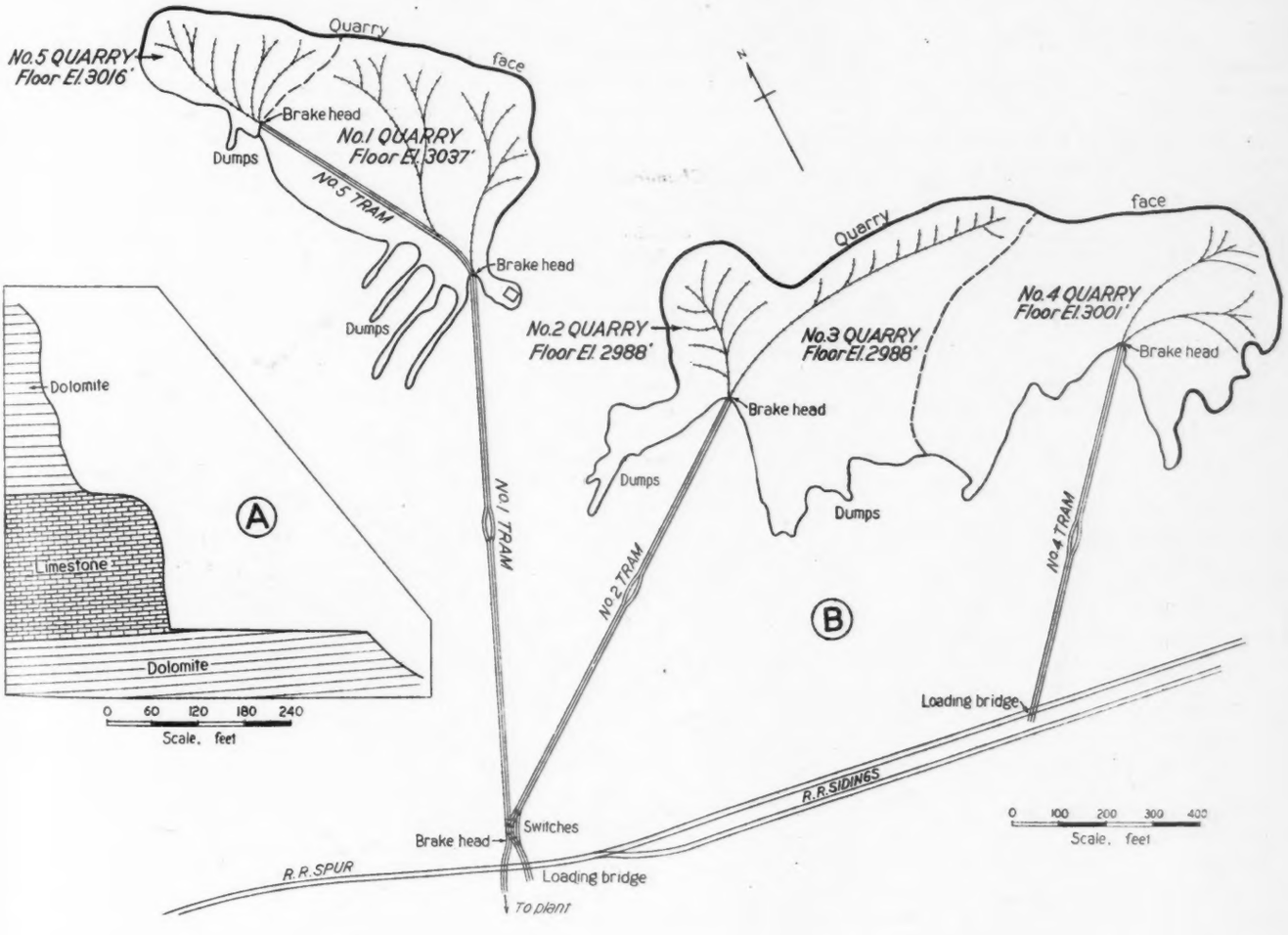

Fig. 1. (A) Section of quarry floor; (B) plan of quarries

rock per pound of black powder. The accompanying table gives details of the two shots the plans of which are shown in Fig. 3.

The shots shear cleanly and generally leave a face free from dangerous overhang or raveling. The overbreak is usually about 40% in excess of the tonnage of the prism bounded by vertical projection of the area outlined by the tunnels and the face of the quarry. No rock is thrown by the blasts, and about 60% of the tonnage broken in primary blasting is in pieces that weigh less than 30 lb. This is true of both limestone and dolomite.

The large boulders are broken by secondary blasting with hand-held jackhammers. A hole is drilled in each boulder to a depth ranging from 1 to 3 ft., depending on the size of the rock, and charged with ½ to 2 sticks of ammonia dynamite of 25% strength. The sticks are ⅞-in. in diameter and 8 in. long. The entire drilling and blasting operations, both primary and secondary, for an annual output of 100,000 tons, requires the intermittent labor of only two men. Nearly as much explosive is used in secondary blasting as in the primary shots, as boulders constitute about 40% of the primary break. The average consumption of dynamite in secondary blasting is 1 lb. per 3½ tons of stone.

DETAILS OF TUNNEL SHOTS

		A			*B*	
Tunnel footage		139.00			51.00	
Rounds driven		62.00			28.00	
Feet per round		2.24			1.82	
Rounds per shift, two men		3.20			3.38	
		Total cost	Cost per ft.		Total cost	Cost per ft.
Driving:						
Shifts	39	$185.25	$1.33	16.5	$78.38	$1.53
40% dynamite, lb.	450	63.00	0.45	250.0	35.00	0.69
Detonators, number	354	4.83	0.04	156.0	2.13	0.04
Fuse, ft.	888	5.77	0.04	424.0	2.76	0.05
Cost		$258.85	$1.86		$118.27	$2.31
Loading and back filling:						
Shifts	11	52.70	0.38	3.5	16.62	0.32
Explosive:						
Black powder, lb.	10,500	772.80		2,000	147.20	
40% dynamite, lb.	200	28.00		50	7.00	
Total cost of shot		$1,112.35	$2.24		$289.09	$2.63
Estimated tonnages broken		25,000			7,000	
Cost per ton		$0.0445			$0.0413	

Sizing, Loading and Transportation

Medium-sized boulders are broken to the required dimensions at the quarry face with 14-lb. hammers. The spalls are forked to eliminate the dust. Crude direct-shipping stone and spalls are loaded separately by hand into 20 cu. ft. capacity steel cars of the end-dump type, equipped with 14-in. cast-steel, roller-bearing wheels. The height of the cars above the track is 42 in.

Two men with a single car constitute a loading and tramming unit. Cars are hand-trammed to the head of the gravity tram an average distance of 200 ft. As shown in Fig. 1, permanent feeder tracks are run from the brake heads approximately parallel to the quarry face, and from these feeder tracks branch loading trucks are laid at suitable intervals to the piles of broken rock. The branch loading tracks are built in sections for easy replacement and extension. Feeder and loading tracks are made of 12-lb. rails placed on 4x6-in. pine ties 30 in. long. The track gage is 18 in. The average tonnage loaded and hand-trammed per man-shift of 8 hours is 10.8 for both lump and spalls.

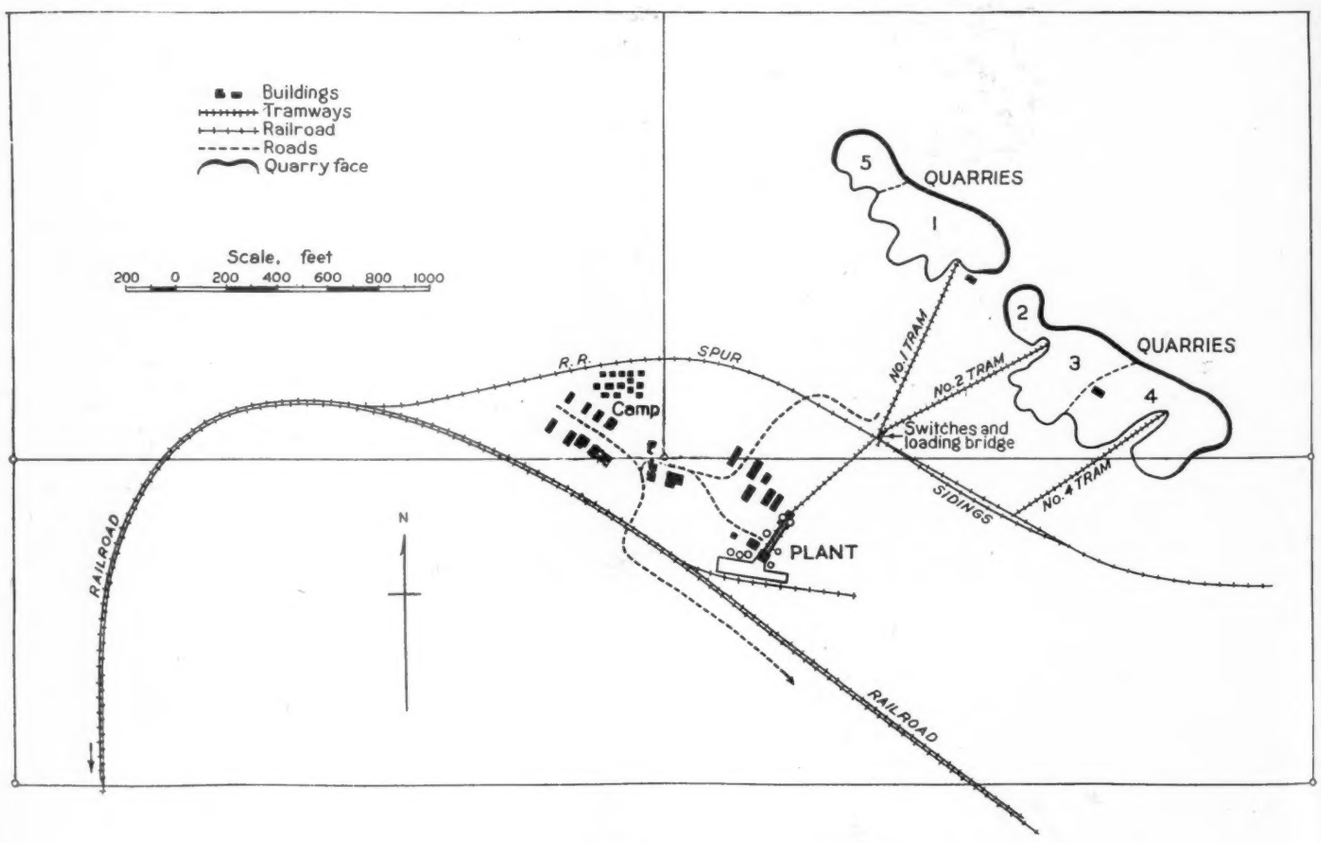

Fig. 2. General map of quarry property

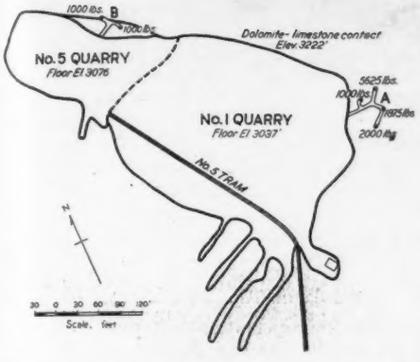

Fig. 3. Plan of tunnels for two tunnel shots, showing loading

Gravity Tramways

The loaded mine cars are lowered to the lime-burning plant or the railroad cars by three gravity trams of the 3-rail type. Each tramway is about 1000 ft. long, constructed of 20-lb. rails, with a 4-rail passing at the center. The 4-rail passing eliminates the use of spring switches and prevents cable interference. A loaded car is used to pull an empty one up to the quarry floor. Tramway ropes are ½-in. in diameter and are made up of six strands with 19 crucible-steel wires each. Each rope handles about 100,000 tons of rock before replacement. Maximum tramming speed is 1200 f.p.m. To prevent delays caused by derailing of the cars, special precautions have been taken in the construction of the tram roadbeds which are well ballasted with rock from the quarry, and tracks have been laid to a smooth and even grade. The loaded cars are controlled in their descent on the incline by a home-made combination sheave-and-brake mechanism, the details of which are shown in Fig. 4.

The loaded cars at present are delivered by two of the trams to a central point behind the plant, where they converge as shown in Fig. 3. At this location a standard-gage spur track has been run three-quarters of a mile from the main-line railroad. This spur track passes under a loading bridge from which the mine cars containing crude rock for direct shipment are dumped into 60-ton standard gondolas. Spalls and dolomite are switched to another tramway of the same type and transported 600 ft. further to the lime-burning plant, as indicated in Fig. 2.

Crushing

The high-calcium rock for the rotary kilns is dumped from the cars directly into a 100-ton wooden receiving bin (see Fig. 5) from which it is fed through an overcut-arc gate to a 9x38-in. roller-bearing crusher of the Blake type, equipped with manganese-steel wearing plates, and driven by an 8-in. belt from a 20-hp. electric motor operating at 900 r.p.m. The crusher is set to break to 2 in. The crusher discharge passes by gravity to an elevator with sprocket centers spaced at 80 ft. Elevator buckets are 9 in. long, 5 in. wide and 5 in. deep. They are made of cast steel and are spaced on 16-in. centers. The elevator is driven at 300 f.p.m. by belt and gears from a counter shaft and discharges by gravity into a 30-in. diameter trommel 6 ft. long made of ¼-in. plate with ¼-in. round perforations. The trommel speed is 18 r.p.m. The undersize from the trommel is rejected as unsatisfactory for kiln use. The oversize is discharged by gravity into two steel silos supported on a 3-bent timber structure. Each silo is 10 ft. in diameter and 22 ft. high. From the silos the limerock is fed to the rotary kilns. (See Fig. 5.)

The quarry cars containing dolomite are switched to the foot of an incline where they are elevated to the tops of the three vertical kilns.

Power Plant

The crusher and all plant equipment is driven by motors using 3-phase, 60-cycle, 440-volt current. Current is supplied by two 90-kva. 440-volt electric generators direct connected to two 120-hp. solid-injection, 2-cycle Diesel engines. The Diesel engines use fuel oil of 27 deg. Baumé and are cooled by distilled water which circulates through a set of Braun exchangers augmented by spray towers. Distilled water is used, as the water obtained locally is high in lime and would form incrustations in the engine jackets. The installation has proved economical and satisfactory. The cost of power for the plant, exclusive of the air compressor, is a fraction over 1 c. per kilowatt-hour as shown in the following table:

COST OF POWER

Fuel oil	$0.00414
Lubricants	0.00080
Operating labor	0.00339
Maintenance	0.00031
Carrying charges, interest, depreciation, etc.	0.00420
Total cost per kilowatt-hour	$0.01284
Fuel consumption per kilowatt-hour	0.69 lb. = 0.084 gal.
Lubricating oil per 100 kilowatt-hours	1.28 lb. = 0.166 gal.

Per Cent. Extraction

The ratio of stone sold to the amount broken from the solid is at present approximately 85 to 100. The remaining 15% is stockpiled for future calcination into lime or for possible sale as railroad ballast.

Wage Scale

All quarry work is paid for on the daily wage system, based on an 8-hour day. The daily wage scale as of September, 1931, for the principal classifications of quarry labor was as follows:

Breakers, loaders, trammers	$4.00
Dumpers	4.00
Brakemen	4.50
Tunnel and powdermen	5.00
Foremen	7.00

Safety Methods

The foreman is responsible for the safety of the workmen under his direction and is supplied with all the rules and regulations both of the company and of the Industrial Accident Department of the State of Nevada. He is also trained in first-aid work. The operations at Sloan are not large so that close supervision of all stages of quarrying can be obtained under a single foreman.

Administration

A general superintendent shares his time about equally between the Sloan plant and other operations of the company. There is no resident superintendent. Two foremen, one for the quarries and one for the lime-burning plant, cooperate harmoniously, and this arrangement has proved satisfactory. With a larger plant, employing more men, a resident superintendent would be necessary.

The quarrying operations at Sloan are interesting not only from a technical viewpoint and because of the magniture of the deposit, but also because the quarry is located in a desert region far removed from the centers of population where lime is used. The quarry and plant are in Clark county, Nevada, 20 miles west of Las Veges, which is the nearest town to the site of the Boulder Canyon dam. Sloan is on the main line of the Union Pacific railroad connecting Salt Lake City and Los Angeles. The latter city is 280 miles from Sloan and it is the shipping point for all supplies.

A flow sheet of the entire operation is shown in Fig. 5, but only the crushing section is pertinent to this paper.

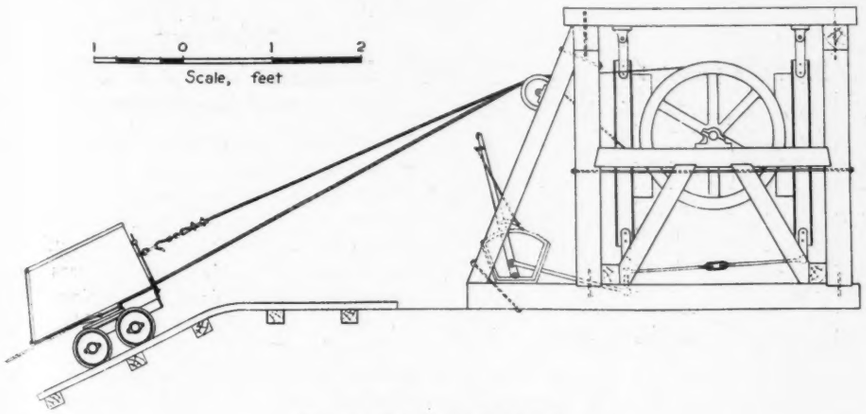

Fig. 4. Tramway brake rig

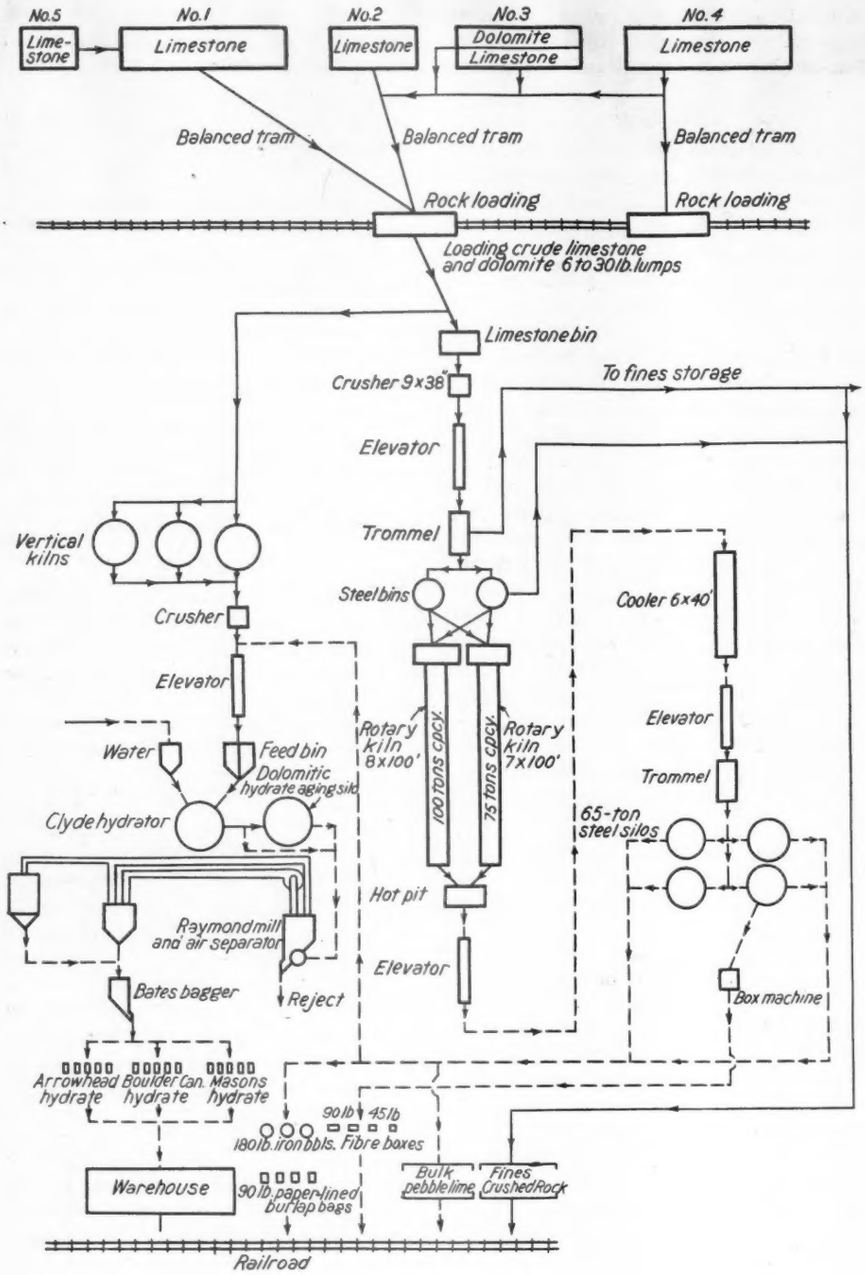

Fig. 5. Flow sheet of plant and operation

TABLE 1—SUMMARY OF COSTS

Sloan quarry. Year, 1930.

Total material loaded during period, 96,200 tons.

Operating Costs Per Ton of Dry Stone Quarried

	*Labor	Super-vision	Air drills and steel	Power	Explo-sives	Other supplies	Total
Primary drilling	$0.008	$0.001	$0.001	$0.001	.....	$0.001	$0.012
Secondary drilling	0.011	0.002	0.001	0.001	.....	0.001	0.016
Primary blasting	0.001	0.001	.....	.....	$0.022	0.003	0.027
Secondary blasting	0.003	0.001	.....	.....	0.018	0.001	0.023
Loading	0.282	0.017	.....	.....	.....	0.006	0.305
Transportation	0.091	0.004	.....	.....	.....	0.004	0.099
Total	$0.396	$0.026	$0.002	†$0.002	$0.040	$0.016	$0.482

*Includes compensation insurance premiums.

†Cost of power for distillate engine driving air compressor only.

Note—Above costs are direct mining costs only. Crushing cost is not included in the above table, as this cost is carried as lime-burning plant charge.

TABLE 2—SUMMARY OF COSTS IN UNITS OF LABOR, POWER, SUPPLIES

Sloan quarry. Year, 1930.

Total limestone loaded during period, 96,200 tons.

	Man-hours per ton
Labor:	
Drilling	0.030
Blasting	0.004
Loading	0.740
Transportation	0.160
Supervision	0.030
Total labor	0.964
Average tons per man-shift total labor	8.3
Labor, percentage of total cost	87.5
Power and supplies:	
Explosives, pounds per ton	0.19
Power, horsepower-hours per ton	0.002
Other supplies in percentage of total power and supplies	51.2
Supplies and power, percentage of total cost	12.5

Report Proposed Revision of Continental Cement Agreement

OWING to depressed market conditions in the Netherlands, it is reported that the existing German-Belgian-Netherland cement agreement will shortly be entirely revised. The difficulties which have risen come chiefly from the fact that British cement manufacturers have been increasingly able to compete against Continental producers because of the sterling depreciation, the U. S. Bureau of Foreign and Domestic Commerce reports. Efforts to include the British manufacturers in the agreement have ended.

Mineral Resources of Alaska

THE United States Geological Survey has issued Bulletin 824, a 177-page pamphlet which covers discoveries of gold, platinum, tin, asbestos, and the many other metals and minerals present in Alaska, with descriptions of locations, climatic conditions, present workings, progress of surveys and other phases of interest. Maps, charts, and analyses are included. There is also discussion of possibilities in areas not yet officially surveyed.

Installing Cables in Shafts and Boreholes

FAILURE of a cable supplying electrical energy to a mine is sometimes traced to faulty or careless practice during the process of installation. The composite experience of consulting engineers, mining companies, and cable manufacturers covering years of practice has therefore been assembled by the Bureau of Mines in Information Circular 6595. The ideas are presented as submitted by the several contributors and cover many phases of installation methods and practice.

The Manufacture of Portland Cement*

Part III—Plant Design and Factors Which Affect Cost of Operation

By S. E. Hutton
Consulting Engineer, Seattle, Wash.

PLANT DESIGN must fit existing conditions, and must be adaptable to future conditions, which may require greater output, an improved product, reduced cost, or the use of different raw materials. Formerly, an important point in this connection was the choice of the wet or dry process, which was often represented as a matter of dust control, but was chiefly a matter of the control of the mix. With raw materials of widely varying composition it is possible to produce by means of the wet process, a reasonably uniform mix with less care, less skill, and less expense than with the dry process. Improved practice and improved equipment have enabled the dry process to compete with the wet process in effectively mixing reasonably good materials, but it always suffers some disadvantage on account of the necessity of drying most raw materials before grinding them.

The size of the plant to be built is a matter of judgment, based on studies of the prospective present and future markets for its product, the costs of plants of various capacities and the cost of production in plants of various capacities. In general it has been found that production costs fall as plant capacities rise—if plants can be kept busy, but there is a point of diminishing returns to be estimated or to be guessed at for each enterprise, which depends not only on the relation between plant and operating costs, and the production capacity of the plant, but on the relation between annual fixed and operating charges of a plant and the number of barrels of its output for which a market can be found.

In the design of a cement plant, four major operations must be provided for: (*a*) the handling of raw materials into the plant, partially processed material within the mill, and the finished material out of the mill; (*b*) the storing of raw, partially processed, and finished materials; (*c*) the processing of material; and (*d*) the controlling of the chemical and physical properties during processing.

Handling Materials

When limestone or cement rock is used, it may come to the mill in large pieces directly from the quarry face, or finely crushed. The latter is preferable for plants located in cities, and is necessary if the rock is to be handled cheaply in scows, barges, or ships, or by aerial tram. Marl is pumped as a thin slurry thousands of feet from beds to cement mills. Shale is handled like rock. Clay is excavated by drag scrapers, power shovels, or hydraulic giant, and is transported in trucks, railway cars, or scows, or as a slip in pipe lines or flumes.

At the mill, trucks and railroad cars are discharged by dumping, and scows and barges usually by means of clamshell buckets. The discharging of a low value bulk cargo from a ship presents an interesting and intricate economic problem, as a ship is an expensive piece of equipment with high fixed and operating charges. Its time is expensive—least so when tied up, more so in port, and most expensive when under way. The cost per hour under each of these conditions can be calculated and used to advantage in working out handling methods and costs. If the operating seasons are short, due to climatic conditions, and voyages are short, as they are on the Great Lakes, the reduction of time in port, loading and discharging cargo, is relatively more important than if operating seasons and voyages are long. These things, with the diversity of cargo and of points of origin and destination account for the highly developed, self-unloading ships found on the Great Lakes. Elsewhere the use of self-unloading ships is generally impracticable, and other schemes must be used. Some reasonable balance must be maintained between the saving in ship's time, and the cost of unloading facilities, which, if possible, should be made to serve other purposes when not discharging ship's cargoes.

The handling of materials within the mill involves the use of some or several of the following devices: clamshell buckets on cranes of various types, drag scrapers, apron, belt, drag, pan, shaking, vibrating, and screw conveyors, skips and elevators, and pneumatic conveyors for pulverized materials. The aims of the plant designer should be to reduce the handling to the minimum and to do the necessary handling at the minimum cost, which means, among other things, that the equipment should be simple, reliable, and efficient, should be easy and cheap to repair and maintain, should serve as many purposes as possible, and should permit the economical distribution of power and labor if its operation is not continuous.

Handling the finished product out of the mill may involve loading bulk cement on trucks, railway cars, or water craft, as well as loading sacked cement on similar carriers.

Storing Materials

In some localities, quarry and clay pit operations are seasonal, and in some cases transportation service may be intermittent due to climate or to insufficient business to make it continuous. Under such circumstances it may be necessary to store at the mill quantities of raw materials far in excess of those required to take care of the normal fluctuations in operations. The maximum of such stocks must be determined, space for storing and means for handling them must be provided, and the costs of handling and of carrying the investments in them must be estimated.

In any manufacturing plant there is always considerable material in process, and in storage between operations. Such materials require storage space, and represent capital in use, and they should be reduced to a minimum. Uniformity of raw materials, good equipment, good technique, and good management contribute to economy in this direction. For example, if raw materials are so nearly uniform that a correct raw mix can be made in the grinding mills, few slurry tanks, the minimum of testing, and no blending of slurry are required. If the slurry is uniform in composition, and if kilns are well and uniformly operated, uniform clinker will be produced so that the minimum of stock and little or no blending of clinker in storage will be required. If equipment is of proper kind and capacity, and well cared for, there will be few interruptions of operations, and need for less equipment and storage capacity than in a poorly designed or badly operated plant.

The sales of cement vary more with the seasons in some territories than in others;

Editor's Note

PLANT design covers such details that it is of very great interest and value to operators of all plants, old and new. Generally speaking, plants in the cement industry have been kept uptodate so far as equipment is concerned. The chief advantage of the more recent plants over the old ones is in design. Few old plants can be made the equal of some new ones, except by complete redesign, even though equipment remains the same.—The Editor.

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but in all plants it is necessary to store cement, for this reason and because all plants must take some idle time each year. In general, as shipping seasons are shorter, and peak demands consequently greater, the ratio of cement storage capacity to plant producing capacity rises. It is the universal practice in new plants to store cement in silos. The number of units into which the total necessary cement storage capacity is to be divided is determined chiefly by the number and the requirements of customers and testing agencies that are to be served with tested cement, but in plants poorly equipped, not well run, or using poor materials, facilities for blending variable mill products in the silos may be convenient or even indispensable.

Processing Materials

The facilities to be provided and the routine to be followed in processing cement making materials must be worked out with a thorough knowledge of the properties of the raw materials, the characteristics of the required product, and, if possible, all adaptable methods and devices in mind. If the dry process is to be used, one of the problems to be considered first is the drying of raw materials, that is, the determination of drying requirements and the finding of economical means of meeting them. Some limestone is so dense that the absorbed moisture is negligible, and only surface moisture is to be driven off. In coarse rock, even this may be negligible. Many raw materials, including porous limestone, chalk, cement rock, shale, granulated slag, and clay, carry considerable absorbed moisture, and must be dried before they can be ground at low cost, if at all. Fine crushing, or even pulverizing, promotes the removal of absorbed moisture, but it increases the dust nuisance which attends drying and which may preclude the use of the dry process in some localities. A dry raw mix can be burned at less cost than a slurry, other things being equal.

Climate or other local conditions, or the use of certain raw materials, such as marl, clay, or rock of widely varying composition, may enforce the adoption of the wet process, which always involves the making, storing, and handling of cement slurry, and may involve the preparation of clay slip. The principal problems connected with using slurry are storage, blending, agitation to prevent segregation of components, and handling. Unless kilns are very long, or are provided with chains or other devices for promoting the transfer of heat from kiln gases to slurry, it is desirable to carry the water content of slurry as low as possible in the interests of fuel economy. The importance of this matter is often much exaggerated. Practically, a very important property of slurry is its viscosity, which determines whether or not it can be handled economically, if at all, in pumps and pipes. Viscosities of slurries vary with kinds of materials, chiefly with fineness, colloidal materials requiring more water than coarser for a given fluidity.

Depending on the character of their raw materials, cement plants may be divided into two broad classes, those whose raw materials are so nearly uniform, when fed to the grinding mills, that the composition and fineness of the mill product is predetermined and is within the limits that will produce a satisfactory kiln feed, and those whose materials are so variable that the composition of the mill product cannot be predetermined and closely controlled, and which must, therefore, grind "high lime" and "low lime" slurries, analyze them, and mix them in proper proportions to make a satisfactory kiln feed. The former class of plants is the more easily and more precisely controlled, and may cost less per unit of capacity.

Raw materials must be taken from their sources, mixed in storage and in handling, and fed to wash mills, crushers, and grinders in such ways as to promote mixing, and, thus progress toward uniformity in composition and fineness, must be ground to or below a critical fineness and mixed intimately in correct chemical proportions, heated to the point of incipient fusion, cooled, and ground finely with the addition of 3 or 4% of gypsum, to make cement, which must be stored, sacked, and shipped.

Grinding is one of the expensive operations, in terms of cost and maintenance of equipment, and in consumption of energy, which must be bought or must be generated at considerable expense. Much is yet to be learned about the relation of fineness of raw materials to composition and properties; and considerable technical ability and careful experimenting are necessary to apply to advantage and to extend our knowledge of grinding.

Both raw materials and different clinkers are known to vary in grinding properties. Efficiency in grinding is promoted by removing fines as rapidly as they are formed. Multi-stage grinding is more economical of energy but may actually cost more in some instances than single-stage grinding. For at least some raw materials there seem to be critical sizes, near 200-mesh, below which it is not necessary or profitable to go. Cement, to be strong and plastic must be made up largely of materials far below the 200-mesh screen size, but the ideal assortment of sizes, and its proper relation, if any, to composition, are not known. These are among the problems of grinding.

Another major item in the cost of manufacturing cement is that of converting the raw mix into clinker in the kiln. Much of the attention of the operator is centered on efforts to reduce fuel costs, and to raise kiln capacity in order to take care of heavy demands or to reduce labor cost per barrel. In many cases, savings in labor costs made by forcing kilns are far more than offset by concurrent losses in fuel and in kiln repairs, but marketing conditions often justify such operating inefficiencies.

The fundamental requirement in burning clinker is to bring the raw mix to a critical temperature at which the final reactions between lime and silica occur. This is accomplished by exposing the raw material, and the refractory kiln lining, from which the charge picks up heat, to the radiant heat of an intensely hot flame. It is a problem of heat transfer, and involves chiefly a proper combination of temperature, size, and shape of flame, inclination and rate of revolution of the kiln, and intelligent control.

Previous to the final reaction in clinker formation, heat available from the products of combustion at temperatures below that necessary for the final reaction, has driven off the water from the raw mix, heated the remaining solid material, driven the carbon dioxide out of the calcareous component, and caused numerous reactions of lime with alumina, iron, and silica.

Fuel economy in cement burning is principally a matter of good combustion and efficient transfer of heat from the products of combustion to the kiln charge. Proper preparation of fuel—the drying and pulverizing of coal, or the heating and atomizing of oil—and proper proportioning and mixing of fuel and air are the principal contributors to efficient combustion. Efficient transfer of heat is promoted in the hot zone by proper temperature, size, shape, and position of the flame, and elsewhere by great length of kiln, lifters, and festoons of chains, and in a few cases by spraying slurry into the kilns.

A cement kiln has no definite production capacity in the sense that a quart measure has a definite volumetric capacity, notwithstanding that there are various rules for calculating or rather for estimating production capacities of kilns. Any kiln, with its accessories and with a given raw mix, has some maximum capacity beyond which it cannot be forced, but likely before that capacity is reached maintenance costs become prohibitive, and at even less capacity the most economical fuel rate is passed. The output to be taken from a kiln at any time is determined by the cost of the product, and the profit to be made on it. A good operator after some experience with a plant, should know approximately the output at which a kiln will produce acceptable clinker at least cost, the kiln capacity at which the plants as a whole realize the lowest production cost, and costs at other capacities.

Controlling the Product

There are certain standard minimum specifications for cement which must be reached or exceeded. Slight variations in equipment and technique, and numerous conditions over which the tester does not have complete and precise control cause different testers to get different results from a split sample, for which reason, if for no other, the plant standard aimed at must be above the standard specification.

In every industry there are operators with high standards for their products and services, with the materials and equipment necessary to realize them, with well trained, ex-

perienced, and well organized crews, and with routine methods, tests, and checks that protect the interests of the purchasers of their products or services to an extent to which the mere testing of the product can not. Unfortunately, there are or at least there have been, some operators in every industry who seem to believe that the poorer the product of a plant, the less must be its cost of production, and that, therefore, the requirements of the specifications should be exceeded by as little as possible, and not necessarily always reached. Some have been incompetent operators or have made mistakes, and in spite of good intentions have shipped goods below standard. It is too much to expect that the testing of cement by the buyer or his agent can ever be completely dispensed with, but such testing imposes on the industry a heavy tax from which some relief should be sought.

While any wise manufacturer will test his product to make sure whether or not it will meet specifications, such testing is not sufficient control of the manufacturing process, which should be so conducted as to insure the production of required article or material, rather than in such a way to leave that a matter of some doubt until the finished product is tested.

Controlling the product involves sampling and analyzing the raw material deposits, taking at any time such assorted materials as can be made into a uniform raw mix of the right composition, mixing, grinding, and re-mixing to produce a raw mix of suitable composition and fineness, burning the raw mix for a sufficient time and at a sufficient temperature to complete the required reactions, adding to the clinker sufficient gypsum to control the setting time, and grinding the clinker to such fineness and assortment of sizes as to secure the properties required and desired.

Controlling the manufacturing process and testing the finished product require well equipped and properly operated laboratories, and men suitably educated, trained, and managed. Scarcely any operation can be conducted to best advantage without carrying on various investigations and experiments, in addition to routine control, for information is often needed in connection with efforts to overcome current difficulties and to avoid new ones.

Delivering the Product

Cement is a commodity whose ratio of weight to value is high so that freight and handling charges between points of production and consumption are a considerable part of the final cost of cement in a structure or a pavement. The railway freight, alone, may be from 19 to 28 c. per bbl. for a haul of five miles or less, and from 30½ to 44 c. for a distance of about a hundred miles, on cement costing from $1.75 to $2.10 per bbl. at the mills. Usually the cement must then be hauled by truck from the railway car to the job. Sometimes cement can be hauled as cheaply from the mill to a job as from the nearest railway siding.

The annual per capita consumption of cement in 1928 varied from 0.54 bbl. in Georgia and Idaho, to 2.57 bbl. in Michigan and 2.73 in California. The consumption in Florida was 1.82 bbl. in 1927, and 0.94 in 1928. Such figures give only vague general information, but they suggest searches for local and more detailed information.

In general, the per capita use of cement increases not only with population but with density of population, is higher in industrial and commercial than in agricultural communities, higher in prosperous and progressive than in backward districts, and varies least from year to year in the more stable territories. Since the most concentrated markets are in and near the larger cities, manufacturing, clinker grinding, and cement packing plants are nowadays located in many cities for the purpose of reducing delivery costs to the greatest extent on the larger part of the output.

Careful studies of present and prospective freight rates, trucking costs, cement handling methods, and concrete mixing and distributiing practices are required, not only in connection with choosing site and planning the work for a new enterprise, but also from time to time in operating a going concern to best advantage.

Selling the Plant Product

In the United States as a whole about 25% of the cement produced is used in commercial building, about the same percentage in the paving of streets and highways, about 20% on farms, 10% in dwellings, 7% in sidewalks, 5% by railways, and 10% for miscellaneous purposes. Naturally the distribution in the trade territory of any cement mill may vary from this, and the variations in different parts of such territory will cover a wide range. Sales policies and facilities must be suited to local conditions.

Cement to be used on commercial buildings is usually sold to the contractors on each job, sometimes actually but more often ostensibly by or through some dealer in the building materials. Occasionally it is sold to the owner of the building, but usually contractors and dealers are strong enough to prevent that. In the larger cities, even though sold to owner or contractor, cement is frequently delivered through a dealer in ready-mixed concrete.

The purchases of cement for paving city streets, and county and state highways are in many localities made by public purchasing agents, and in others by the successful bidders on individual jobs. In all cases political influence may be a potential factor in making a sale of cement for public use.

Cement used in dwellings, on farms, in sidewalks, and for miscellaneous purposes, usually moves in small quantities, and nearly always through dealers, who have to warehouse most of the cement so used. Railroads usually buy direct, and their purchases are usually distributed in proportion to the freight earnings realized through different mills.

To some extent, and for special purposes, the user may prefer one cement to another; but the use of a standard specification, which is not generally understood to be merely a minimum specification on a limited number of cement characteristics, and the concerted rather than individual effort of cement manufacturers to promote the greater and better use of cement, have done much to lead buyers to believe that "cement is cement," and that no cement manufacturer can offer more than his competitor except better service, lower price, or greater influence through personal, political, financial, or commercial connections.

(*To be continued*)

Resources of Turner Valley, Canada

A REPORT, "The Clay and Shale Resources of Turner Valley and Nearby Districts," has been issued by the Department of Mines of Canada. The work was done under the direction of the ceramic division of the Mines Branch at the request of the Turner Valley Waste Gas committee.

Quarrying Costs at Utah Copper Co. Mine

THE Utah Copper Co. operates one of the largest quarries, or open-pit mines, in the world. It is called a mine, because it yields a low grade copper ore, but it is not a pit. It is a mountain-side quarry operation, similar to hundreds of others except in size. The following cost data, from the company's annual report, are interesting:

The report of the vice-president and general manager shows that overburden excavated and disposed of during the year came to 4,901,724 cu. yd., a decrease of 26% from 1930. However, the direct stripping cost of 22.15c. a cubic yard in 1931 was the lowest on record. Due to increased shovel loading and maintaining low man count, the mine was able to bring the total tonnage loaded per man per shift to 58.02 tons, an increase of 3.96 tons over 1930 and two tons above the 1928 figure, which was the best previous record. The area now covered by mining and stripping operations is about 448 acres.

Utah Copper mined 8,147,764 tons of ore in 1931, compared with 9,552,500 tons in 1930. The cost of mining, including proper apportionment of fixed, general, suspense and stripping charges (not including depreciation and federal taxes) was 39.57c. a ton. The actual mining cost exclusive of stripping was 18.56c. a ton, of which 12.44c. represents direct mining cost and the remainder fixed and general charges. The expense of stripping waste, together with an apportionment of similar charges previously deferred, was 21.01c. a ton of ore mined.

Opportunities for Using Indicating and Recording Control Instruments in the Rock Products Industries

Part VIII—Instrumentation in the Chemical Industry

By James R. Withrow*
Chairman, the Chemical Engineering Department, Ohio State University

IN PREVIOUS ARTICLES examples have been given of the advantages of instrumentation in the automobile and petroleum industries. In the present article the chemical industry is used as a further illustration of the progress made through instrumental control.

Many processes in the chemical industry require the addition of heat at certain critical temperatures in order to complete the reaction. Accurate control of the heat is, of course, necessary for best results. Such control has been accomplished in a very satisfactory manner through instrumentation as will be pointed out in the case of certain processes. During the past decade there has been a steadily increasing trend toward automatic temperature control and a large number of such controllers have been placed in use.

Synthetic Ammonia Manufacture

The importance of instrumentation to the chemical industry is well illustrated by the synthetic ammonia developments of the last decade. It is not possible to carry on this work without instrumentation. Plants for taking the nitrogen from the atmosphere and converting it into ammonia for fertilizing and refrigerating represent a large investment. The handling of the gases, nitrogen and hydrogen, has brought about an entirely new engineering technique. Hydrogen gas when mixed with oxygen is highly explosive and very dangerous. However, instruments have been developed which safeguard the process as far as human mistakes are concerned. The work is done in apparatus constructed to withstand a pressure of 15,000 lb. per sq. in. and at temperatures above red heat.

Among the new inventions in instrumentation in such plants are the constant control of the ratio of steam to gas for making hydrogen by the combustion of carbon monoxide in steam; conductivity devices to control the percentage of carbon dioxide in the scrubbing water for washing the gases; high pressure flow meters operating in lines up to pressures of 15,000 lb. per sq. in.; and recording flow meters over weirs for various chemical solutions.

Lithopone Manufacture

Lithopone, a white pigment used in the manufacture of linoleum, rubber tires, etc., is the product of double precipitation of barium sulphate and zinc sulphide. After precipitation, the product is thoroughly washed, dried and then calcined in sealed furnaces or retorts. At a cherry red heat the mass is usually quenched in cold water. During this process the temperature control is of great importance in obtaining a successful product. The use of automatic temperature controllers for the processing of lithopone is shown in Fig. 35 (courtesy of

Editors' Note

***THIS SERIES** of articles is designed to interest rock products operators in the possibilities of instrumental control of operations, still almost entirely controlled by rule-of-thumb. Other industries with similar control problems have far outdistanced the rock products industry.*

These articles are not intended to be complete or detailed descriptions of processing. They present only a sketchy outline of such processing — but enough, it is hoped, so that the wide-awake rock products operator will see parallels or at least similarities to his own operations.—The Editors.

*The author is indebted to Dr. Wei Yang for assistance in organizing this material and to the Engineering Experiment Station, Ohio State University, for a portion of the expense connected therewith.

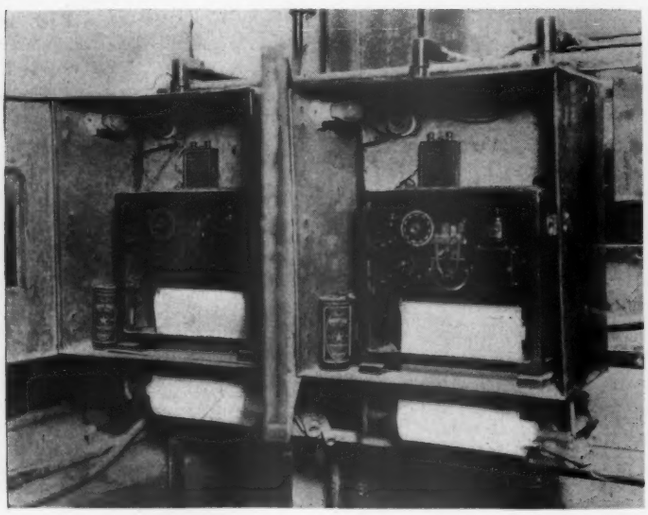


Fig. 35—Automatic temperature control instruments used in manufacture of lithopone

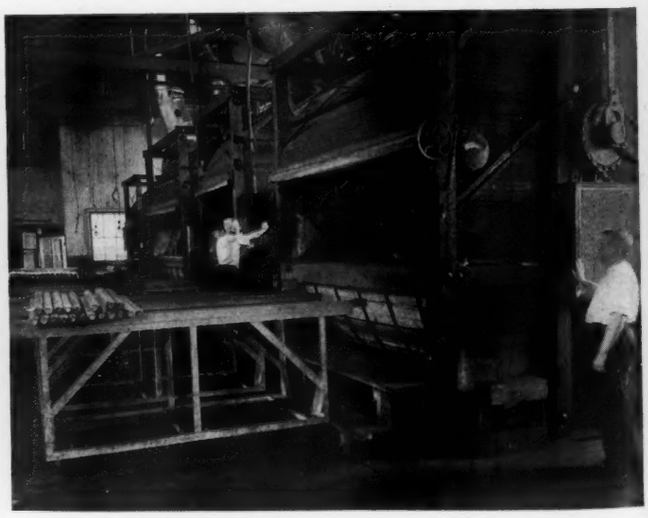


Fig. 36—Temperature measuring instruments used to maintain a constant temperature in drying

Leeds and Northrup Co.). The two controllers have strip temperature charts hanging from the instruments and the recorded lines indicate how slight the temperature variations are.

Dyeing

Fig. 36 (courtesy Brown Instrument Co.) shows the use of a temperature measuring instrument in the mixing of the dye and in the operation of the sulphur black dyer. In dyeing with sulphur dyes, the colors are usually applied at or near the boil. It is best to keep the temperature just under the actual boil in order to prevent undue oxidation of the coloring matter in the bath. A temperature of 208 to 210 deg. F. with a quiet and not a bubbling liquor is desirable, and it is important that this temperature be maintained throughout the entire run of the goods so that all portions of the fabric may receive equal treatment. This is true of dyeing both in the jigger (vat dye machine) and the continuous dyeing range. In the dyeing machine shown in the illustration, the temperature is kept constant by means of a steam coil and is checked by thermometers. With the operation of this sulphur black dyer, a recording thermometer is used, as the process cannot be watched because of the fumes and steam.

Bleaching

Bleaching is done with a hypochlorite or a hydrogen peroxide solution, depending upon the quality of the goods and the results expected.

In bleaching with hypochlorite, a solution of chloride of lime is used, or one of sodium hypochlorite produced by absorbing liquid chlorine in alkali or by electrolysis of common salt in a suitable electrolytic cell. Whatever bleach solution is used, the temperature factor of the liquor is important. If the liquor is too cold, its bleaching activity is much lessened and it takes too long to accomplish a given result. If the temperature is too high, the bleaching activity shows an acceleration of the bleaching reaction at first, followed by a rapid decline. This is caused by the rapid increase in bleaching activity as the temperature of the liquor is raised above normal. When the temperature goes too high the bleaching solution becomes unstable and decomposes, with the formation of chlorate, which has no bleaching power. At the same time, oxycellulose is formed, resulting in the rotting of the goods and the weakening of the fiber through over-bleaching.

The use of ordinary "cold" water leads to a very indeterminate condition of affairs, for its temperature varies greatly. A good temperature for the bleach bath is about 80 deg. F. for cotton goods, and by using suitable temperature control apparatus this can be maintained and uniform results assured. Low-grade fabrics may require a bleach liquor at 100 deg. F. and in this case close control of the temperature is very essential.

For bleaching high quality cotton goods made from fine combed yarns, a bath of hydrogen peroxide or sodium peroxide is frequently used. This bath is usually employed at a temperature of about 140 deg. F. over a period of 8 to 10 hours. As the temperature of the liquor has much to do with the bleaching activity, it is important that it should be maintained at the desired point by suitable control of the heating medium, which in this case is usually a steam coil. If the liquor gets too cold, the bleaching efficiency rapidly falls off resulting in imperfect color and will lack proper penetration into the heart of the fibre. If the temperature gets too high the bleaching bath decomposes and does no work.

Drying

The drying of cloth as the finishing process ends in the textile industry, is another operation that needs intensive instrumentation. Here, besides the use of temperature measuring devices, the humidity has to be watched and carefully controlled. In the drying of sized fabrics, constant temperature and humidity conditions are very important, especially of cloth dyed in the size, this being even more important than in the drying of unsized cloth. In the latter case, things are apt to even up more or less on standing in the air, but in the case of dyed and sized cloth or of sized white goods, the temperature of drying and the humidity may often have a more or less permanent effect on the cloth. Furthermore the color may shade through the cloth if the temperature and humidity conditions are not maintained constant through the whole run of the cloth. The entering end of the hot air dryer may stand a temperature of 160 deg. F. while the delivery end comes down to 140 deg. F. But whatever the established limits of temperature and humidity in drying, these conditions should be maintained if uniform goods are to be expected.

Recording wet and dry bulb thermometers are used to give a continuous record of both temperature and humidity.

Japanning

Temperature control in operating japanning ovens is rather ticklish. They must not be too hot, nor too cold. If too hot, there is the danger of scorching the goods or igniting the inflammable vapors. If too cold, it will greatly slow up the work. It was only after the installation of proper temperature control instruments that maximum operating efficiency, from the standpoints of safety, quality and cost, could be obtained. Temperature records show the trend and fix responsibility. Fig. 37 (Courtesy Brown Instrument Co.) shows the use of recording thermometer in operating japanning ovens.

Soap Making

Fig. 38 (courtesy Foxboro Instrument Co.) shows the use of recording thermometers in the crutching operation in the mak-

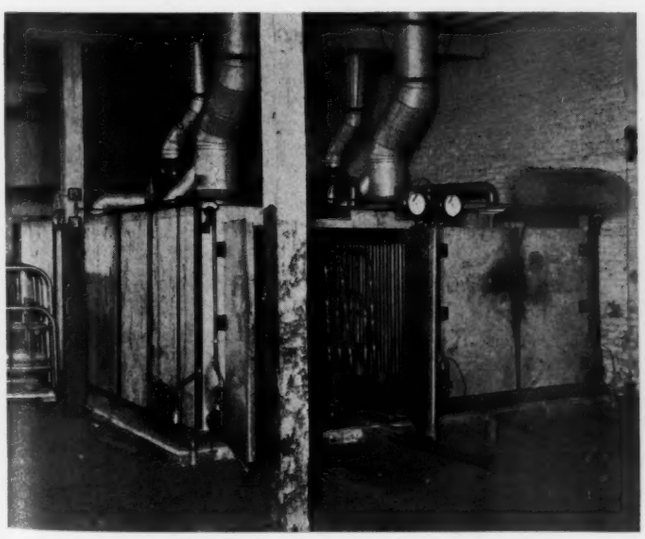


Fig. 37—Recording thermometers show temperatures of japanning ovens

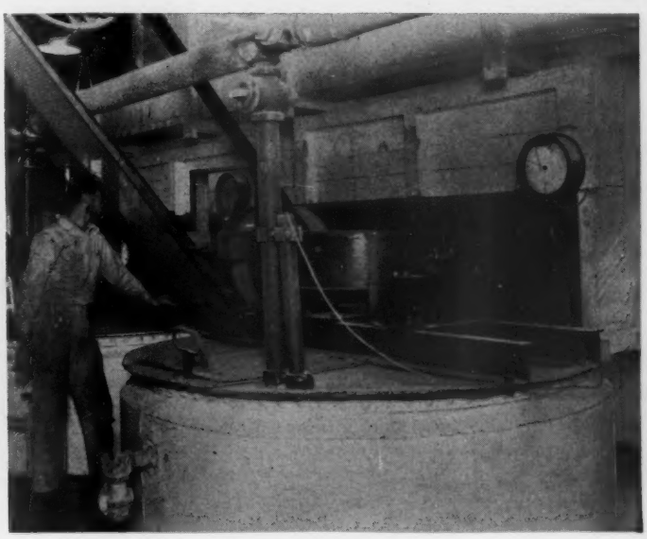


Fig. 38—Recording thermometers used in soap manufacture

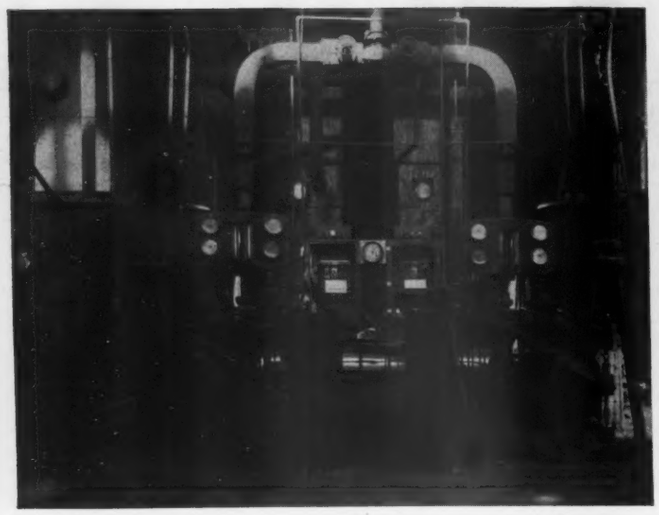


Fig. 39—Signaling pyrometers used in gas manufactur

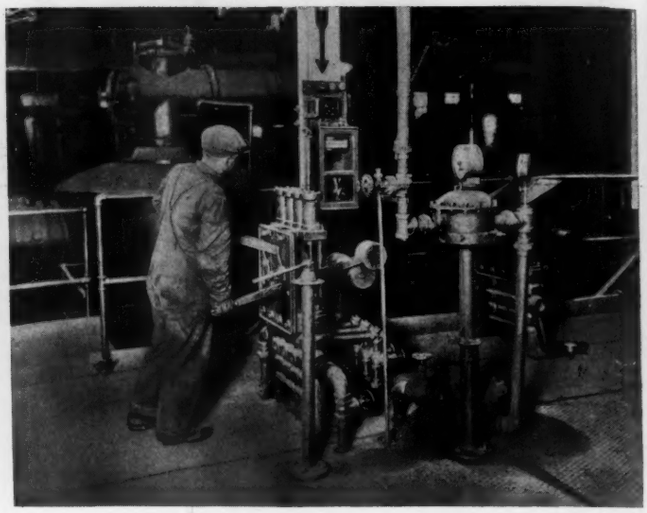


Fig. 40—Automatic signaling pyrometers used in gas manufacture

ing of soap. The crutcher is jacketed and into this jacket either steam for heating or water for cooling is introduced. A stirring mechanism is shown on the top of the crutchers for stirring and agitation. Any material such as sodium carbonate, borax, starch, perfume, etc., can thus be incorporated into the soap. The temperature at which the soap is dropped is carefully controlled in each crutcherful and regulated by either introducing steam or water to the jacket. Good results are obtained by keeping this heat at about 140-144 deg. F. When thoroughly mixed, the soap, still semi-liquid, is dropped out of the bottom of the crutchers into frames, in which it ages. The mixing of air with soap is accomplished in these crutchers. This air is what makes all floating soap float.

Canning

In canning vegetables, where the value of one charge may represent a value of $100 to $200, the processing must be conducted under exact condition of temperatures and time. The temperature may vary between 240 and 245 deg. F. depending upon the product in the retort. An air-operated pressure regulator and indicating and recording thermometer are used on each retort at one large cannery in New York state. For the cooking of jam and preserves, steam at 80-lb. pressure is used. The temperature control must be very sensitive, for a single degree rise over the maximum on jelly will result in a loss equal to 4%.

The cost of instruments at this plant was $5,000 but they permitted an annual saving of $4,400 or a yearly return on the investment of 87%.

At another plant automatic control apparatus was installed at a cost of approximately $185 per unit to control cookers and sterilizers. Before this installation it was difficult to maintain the correct temperature but with the installation of the unit, the human factor was eliminated and uniformity attained. Thus, more batches per kettle per day were possible and a large amount of steam was saved. One man can take charge of a battery of kettles instead of one or two, with more accurate results, than if he were taking care of only one kettle without the automatic control. A permanent record of the production is also available for future reference. The savings depend upon production but each installation paid for itself in approximately a week after installation.

The value of instrumentation in the making of soup and other food products amounts to hundreds of thousands of dollars, as the product would be valueless without uniformity and could not be sold. There is no way of getting uniformity of quality except by automatic temperature control.

Manufacture of Gas

In the manufacture of "water gas," so largely used as a basis for the production of city gas, correct temperature in the fixing chambers is very necessary for good results. Usually the water gas is enriched by the addition of a hydrocarbon derived from cracking gas oil. In this case the profit lies within the narrow limits of a few degrees of temperature. Below that temperature one gets incomplete cracking, resulting in an excess of tar which causes trouble in the whole process. Above that temperature excess naphthalene and lampblack will result. In either case the gas output is reduced and fuel wasted.

The best temperature is within a total variation 25 degrees of 1400 deg. F. Beyond that point, the efficiency of the oil falls rapidly, and tar diminishes, while the lampblack production climbs rapidly. Below that point, there is less oil efficiency and more tar. To maintain the most advantageous temperature sensitive instruments must be used.

Fig. 39 (courtesy Leeds and Northrup Co.) shows the use of signaling recorders in a large gas manufacturing plant. Fig. 40 (courtesy Brown Instrument Co.) shows the use of automatic signaling pyrometers in the manufacture of water gas. Recording thermometers are also used to check the temperature of the water with which gasometers are sealed.

Linoleum Manufacture

The composition of linoleum varies over a wide range and depends on the processes as well as materials used by different manufacturers. However, one thing common to all is that the material must be properly dried. Fig. 41 (courtesy Foxboro Instrument Co.) shows the use of a recording thermometer on a linoleum drying oven. The linoleum is seen coming from the dryer. One Ohio plant has coated 84 miles of cloth a day. Considering 4 coats on each cloth this is a total of 336 miles per day. At this rate how much might be lost by hand control of temperature?

Varnish Making

A varnish kettle is about 30 to 36 in. in diameter with a flat bottom, loose cover and chimney outlet. The kettle is set on a three- or four-wheeled truck built so that the bottom of the kettle is not more than a couple of inches above the floor. Resin is placed in the kettle and it is wheeled over the fire at the floor line. Fig. 42 (courtesy Foxboro Instrument Co.) illustrates the use of recording thermometers in varnish kettles, the recorder and chart being stationary, while the bulb is loose so that it can be moved from one kettle to another.

Wood Preserving

Two kinds of preservatives are commonly used to protect wood against decay and insects. These are zinc chloride and coal tar creosote. The lumber is usually seasoned either by air or by steam before preservative treatment. In steam treatment, the pressure in the treatment cylinder should be not more than 30 lb. per sq. in. for not more than 20 hr. at not more than 274 deg. F.,

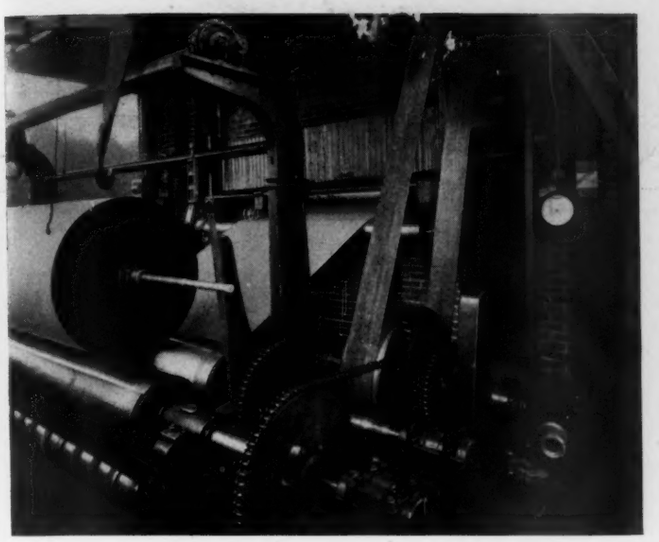


Fig. 41—Recording thermometer used on linoleum drying oven

Fig. 42—Recording thermometers on varnish kettles

which temperature and pressure maximum should not be reached in less than two hours. After steaming, a vacuum of at least 22 in. should be maintained for not less than 15 minutes, or until the wood is dry. Zinc chloride is added without breaking the vacuum until the cylinder is filled and the pressure then raised to a minimum of 100 lb. per sq. in. and maintained until the stipulated quantity of preservatives is injected into the timber. During the pressure period the temperature of the preservatives should be not less than 140 deg. F. nor more than 200 deg. F. and should average at least 150 deg. F. Temperature control is very important in this operation. Creosoting of timber is done in a similar manner under instrumental control.

Rayon Manufacture

In the manufacture of artificial silk or rayon instrumentation plays an important part. In the ageing operation (in the viscose process) the crumbs are stored in a room in which the temperature is very closely controlled. The time and temperature of this ageing period are important factors and when once determined no abnormal variations are permitted.

The drying of the artificial silk has to be done in a very careful manner, as the fibre is quite sensitive to high temperatures. To produce the highest grade of material the temperature must be kept as low as consistent with the requirements of production. The dryers are usually run at from 140 to 100 deg. F. and it is essential that the temperature be maintained constant, as any fluctuations will produce an uneven quality of goods. Generally the temperature of the warm air chamber is automatically controlled to insure the turning out of satisfactorily dried goods.

Other Processes

In the chemical industry some processes were a failure for many years before the introduction of temperature control, as is illustrated by the Solvay or ammonia soda process. The chemistry of soda ash manufacture had been developed over 50 years before engineering was sufficiently developed to use this chemistry successfully. Of the two major engineering problems involved, the outstanding one was the maintenance of temperature within narrow limits, that is, temperature control.

Since the war period automatic control devices have greatly reduced the cost of manufacture. For instance, a plant producing 1300 tons of soda ash and 275 tons of caustic soda per day, requires the burning of 2500 tons of limestone for the production of 1200 tons of carbon dioxide gas, giving 1300 tons of lime as a by-product every 24 hours. The stone is burned in large kilns (12 or 14 in number in such a plant) and the whole plant formerly required some 2300 or 2400 men. Such a plant consists of nearly two dozen carbonating towers, for making bicarbonate of soda, the direct product of the ammonia soda process. Each tower requires two or three men per shift to control the gas flows, temperatures, etc., or from 50 to 75 men per shift, a total of 150 to 200 men per day on the carbonating towers. Now, one or two men per shift, or a total of 3 to 6 men per day, look after all the towers in such a plant, since the introduction of automatic instruments for carbon dioxide and temperature control.

The distillation and recovery of ammonia from the waste liquors of the towers formerly required careful supervision but this is controlled now by automatic instruments in large continuous stills. The instruments control the flow of the still residue by the determination of its ammonia content, thus preventing waste of ammonia. This application of modern instrumental control has cut the labor costs, in a plant of the size mentioned, 1300 tons per day, to practically one-half the war-time figures.

Before this instrumentation development, a production of 1300 tons of soda ash and 275 tons of caustic soda per day required about 1 man per ton of limestone handled or nearly 1.6 men per ton of soda product. The use of instrumentation reduced labor nearly one man per ton of product, and effected large savings.

Asphalt, used principally for street paving,

Fig. 43—Recording instruments on asphalt stills

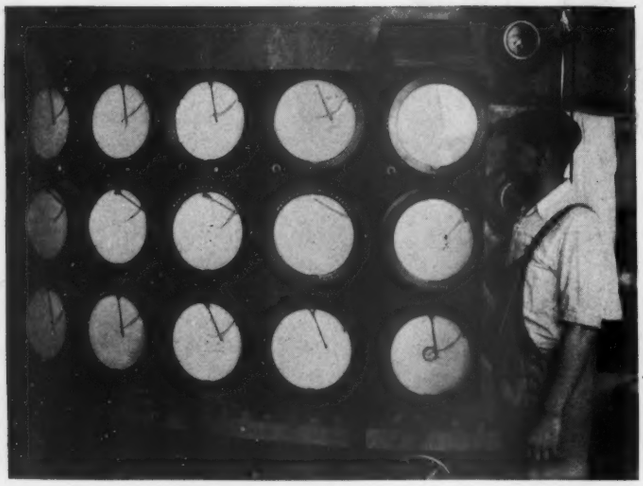


Fig. 44—Instruments used in sugar manufacture

Fig. 45—Recording thermometers on calcining kettles

weatherproofing, paints and japans, is refined by melting and removing the mineral matter by settling. Overheating robs the asphalt of its "life." Fig. 43 (courtesy Foxboro Instrument Co.) shows the use of recording instruments on asphalt stills in a roofing manufacturing plant.

Fig. 44 (courtesy Brown Instrument Co.) shows the use of instrumentation in a sugar house. The instruments are all mounted on a central control board, and the operator can tell at a glance whether or not the units are operating properly. Slight variations in temperature in sugar manufacture may result in large losses.

In the process of calcination, substances are submitted to the action of high heat, but not, however, to the point of fusion. It is evident that in this process, the control of temperature is essential. Materials may be calcined to drive off moisture, to drive off some volatile constituent, or cause a chemical action such as oxidation or reduction. The process is usually carried on in a furnace, of which there are three common types, reverberatory, muffle, and kiln. Fig. 45 (courtesy Foxboro Instrument Co.) shows the use of recording thermometers on calcining kettles in a large chemical works. This is similar to the gypsum or lime industries.

Even in ice manufacturing, instrumentation is necessary. One may think that temperature does not matter in the making of ice, as long as it is maintained below the freezing point. For the making of high grade artificial ice, constant watching of brine temperature is necessary. If the brine temperature is too high it will take too long to freeze the water in the cans. And if the temperature is too low, the block of ice will crack.

Advantage of Instrumentation to the Chemical Industry

The use of proper instruments eliminates guesswork on such operations as drying, evaporating, distilling, retorting, reducing, and cooking and thus eliminates waste of time, labor and spoiled material caused by poor control and saves the waste of fuel caused by fluctuating temperature and pressure. Proper instrumentation also gives a check on the men and equipment and provides a record of the operation. It also gives accurate information as to the best operating conditions and gives a permanent record to guide the men. Automatic control insures correct control continuously without hand adjustment and thus eliminates the human element. The modern chemical industry could not get its present results without instrumentation and countless other businesses would thereby suffer. This industry is noteworthy for large production with little visible labor and for this, instrumentation is largely responsible. Very considerable savings have been effected in various branches of the industry through the use of automatic control instruments.

(To be continued)

Prospecting with Explosives

"GEOPHYSICAL PROSPECTING with Explosives and the Seismograph" is the title of an excellent little treatise on the subject issued by the Atlas Powder Co. It has been prepared in collaboration with Dr. Eby, formerly chief seismologist of the Shell Oil Co.

This method of studying and exploring the structure of the ground below the surface has been made possible by the invention of the seismograph, popularly thought of as an earthquake indicator. The more recent form, the electrical type, is best adapted to prospecting as it can be carried anywhere and set up without a solid foundation. And it sends its vibrations, much magnified, over a wire or by radio to a distant station. In both forms the effect of shock is recorded along with the exact time the instrument receives it on a moving ribbon or film.

The waves set up by an explosion are really sound waves, and the harder the medium through which they pass the faster they travel. Hence if a wave is received through two strata at different times for the same distance it is concluded that one strata is harder than the other. The velocity through different kinds of rocks is given in a table in the treatise, and this helps to identify the rock through which the wave passes.

These waves can be refracted (by passing out of one medium into another) and reflected (just as a light wave is reflected). Refracted waves are mainly used to tell of changes in the rocks below and reflected waves are valuable to show the depth of flat strata. The book shows a very clever way of placing two seismographs so that the refracted waves they receive will neutralize one another while the reflected waves will reinforce one another.

It has been found that burying the charge increases the intensity of the explosion from 50 to 100 times, so charges are generally placed at the bottom of a hand-drilled hole, 12 to 25 ft. deep. This is usually chambered at the bottom to receive the charge which should be large enough so that its shock may be easily distinguished from jars of traffic, drilling and so on. Recent practice is to sink holes from 60 to 100 ft. Such holes do not crater, and experiments have shown that cratering seriously diminishes the effect on the seismograph. These drilled holes may be shot four or five times, and less dynamite is required to give the same result. With deeply planted charges (100 ft.) intelligible seismograms have been received at distances of over 12 miles. But deep hole drilling for prospecting is expensive and less fast than the simple hand drilling.

Large size cartridges are generally used, the 4x8-in. size being favored. In marshy ground, where the cartridges are pushed into the ground with a wooden tamper, and for underwater shots 8x24-in. cartridges are used.

Field Conveyors from Pit to Preparation Plant Save Money

(Contributed)

AMONG the unusual developments in methods employed by aggregate plants during the past year is that employed by the Consolidated Sand and Gravel, Ltd., of Paris, Ontario, and the Consolidated Rock Products Co., Asuza, Calif.

Canadian Plant

At Paris, Ont., there is one of the most interesting and modern sand and gravel plants in all Canada.

Originally this plant employed a railway system for bringing the material from the face of the pit to the primary crusher. Today, this work is done by the 30-in. wide, 700-ft. long anti-friction belt conveyor illustrated in Fig. 2, with a saving of 13 men. Previously, 17 men were employed in the pit; whereas with the belt conveyor system of transporting the material from the field hopper into which the electric shovel discharges, only 4 men were needed. Besides, the hourly handling capacity has been boosted 30%.

The top of the field hopper, seen in the distance, is provided with a grid having openings that will not allow very large stones to pass through.

The field conveyor delivers to a 30-in. wide, 400-ft. belt conveyor. This is shown in Fig. 1.

The bar screen, or grizzly, at the discharge end of this conveyor is simply constructed and effective. The larger material slides down to the primary crusher, while the material that passes through the spaces between the bars falls into a large hopper, from the bottom of which it is fed uniformly to the foot of the inclined trestle conveyor, shown at the left of Fig. 3, by means of an apron feeder. This belt conveyor is 30-in. wide by 270-ft. long and is inclined. It delivers the material into a revolving trunnion-type dry screen; then to more belt conveyors; thence to the washing equipment, which includes preliminary scrubbers, two sets of three Dull conical screens, and a drag scraper conveyor; and finally, after it is washed and graded ready for use, the material is delivered into steel storage

Fig. 4. A belt conveyor for transporting sand and gravel from pit to plant built in 30-ft. sections; Consolidated Rock Products Co., Asuza, Calif.

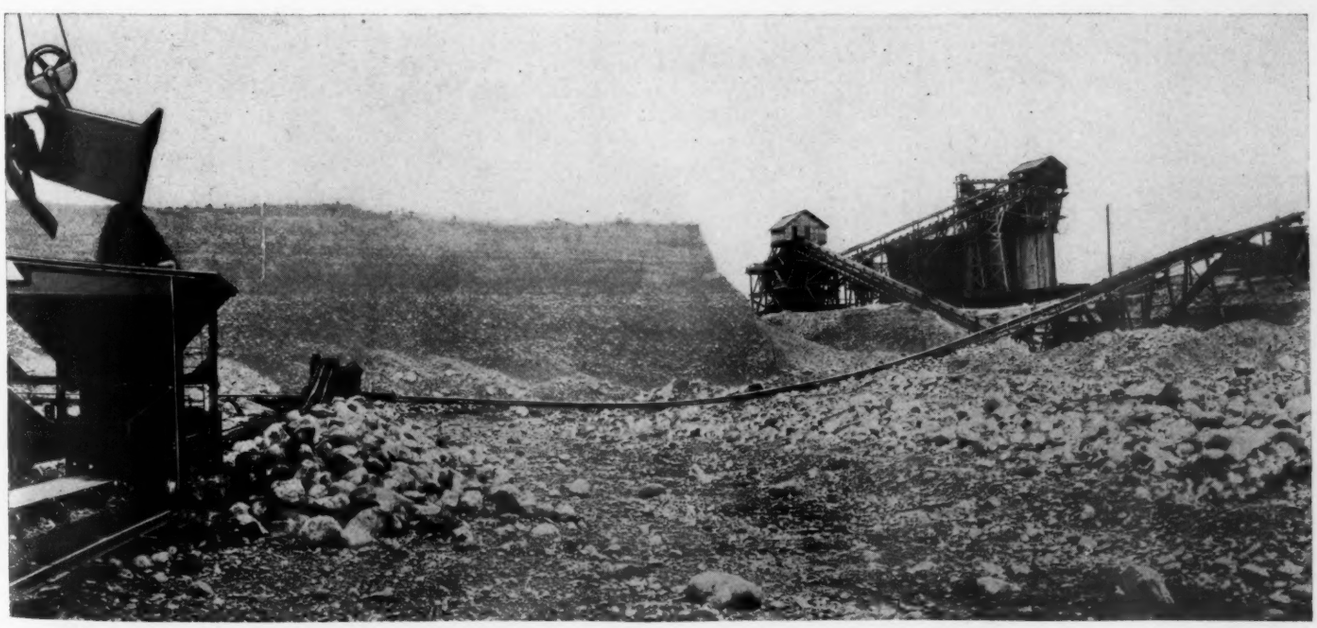


Fig. 2. Plant of the Consolidated Sand and Gravel, Ltd., Paris, Ont., showing use of field conveyor on rough ground

tanks, from the sides of which the particular grade or size of sand, gravel or crushed stone desired can be drawn, through Dull segmental type discharge gates, direct into railroad cars or delivery trucks.

By shutting off the apron feeder above mentioned, only the crushed stone will be delivered to the system. Two short belt conveyors at the right of the main conveyor on the trestle at left, and one of the two conveyors over the railroad tracks to the storage tanks, handle crushed stone only. Flop gates in one of the chutes makes it possible to mix completely the crushed stone or gravel with the run-of-pit material.

This plant's handling capacity is 300 tons per hour. A. G. Bennett is production manager for this plant which, with the exception of a few of the conveyor idlers, is wholly equipped with Link-Belt conveying, washing and screening equipment.

California Plant

The Irvingdale plant of the Consolidated Rock Products Co., Asuza, Calif., has shown savings in operating costs since the installation of belt conveyors for handling materials from the pit to the preparation plant, replacing old transportation equipment. The shovel is workiing at all times at the end of the conveyor, as can be seen from Fig. 4.

After the shovel has dug out enough material, two sections of conveyor are added, each section being about 30 ft. long. This is done at about 60-day intervals. The head drive unit and tail pulley are never disturbed. The tail pulley is built under a reciprocating plate feeder, which in turn is all built under the traveling portable hopper which feeds the conveyor.

The shovel can easily move the hopper back, to enable the men to insert additional horizontal sections. At the present time the conveyor is almost 1000 ft. long. The head drive and tail unit were originally designed for this length conveyor so that these additional units could be inserted and easily accommodated.

The horizontal conveyor is set on wood skids to enable the 42-in. belt conveyor to be moved after the shovel has made a cut from 750 to 1000 ft. long.

With this equipment the actual cost per ton for getting the material from the pit to the scalping screen, using a layout large enough to handle 400 to 450 tons per hour, was given as 3c. per ton based on the 1930 production of over one million tons.

With this equipment the actual cost per ment to that formerly used at this plant, including shovels, cars, tracks, locomotives and hoists this cost was 5½c. per ton, so a net saving of slightly more than 2½c. per ton is realized, or $25,000 annually.

At the present time the Consolidated Rock Products Corp. is utilizing this type of field conveyor in six of its plants.

All equipment, except the shovels, was made by Link-Belt Co., Chicago, San Francisco, or their subsidiaries.

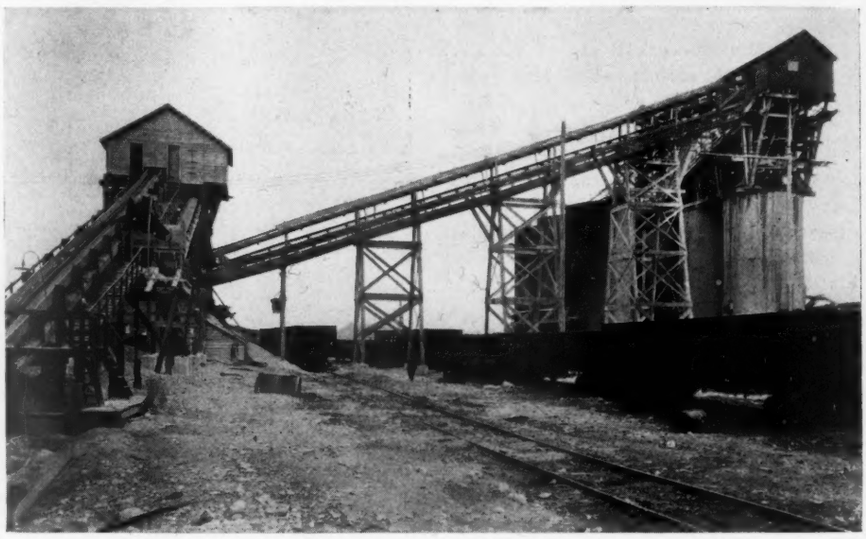


Fig. 1. Plant of the Consolidated Sand and Gravel Ltd., Paris, Ont.

Fig. 3. Plant of Consolidated Sand and Gravel, Ltd., showing discharge end of auxiliary field conveyor

New Plant of Idaho Lime Company

THE PLANT of the Idaho Lime Co. at Evans, several miles south of Bossburg, Wash., on the Great Northern railway, is one of the pioneer lime operations of the northwest. It was taken over by the present owners more than 30 years ago and during the past year has been completely rebuilt, using modern machinery and equipment.

During the latter part of April, 1931, the entire plant, including the cooperage shop, was destroyed by fire. In May, lime burning was resumed by repairing two of the kilns and erecting temporary buildings and plans were started for the rebuilding of the entire plant. The six kilns were later repaired and rebuilt and the hydrating and crushing plant completed and put into operation in September.

The equipment for the new hydrating plant was furnished by the Blaw-Knox Co., Pittsburgh, Penn., and C. J. Jones, York, Penn., was in charge of the reconstruction as erecting engineer. Other equipment was purchased from manufacturers in Spokane, Wash.

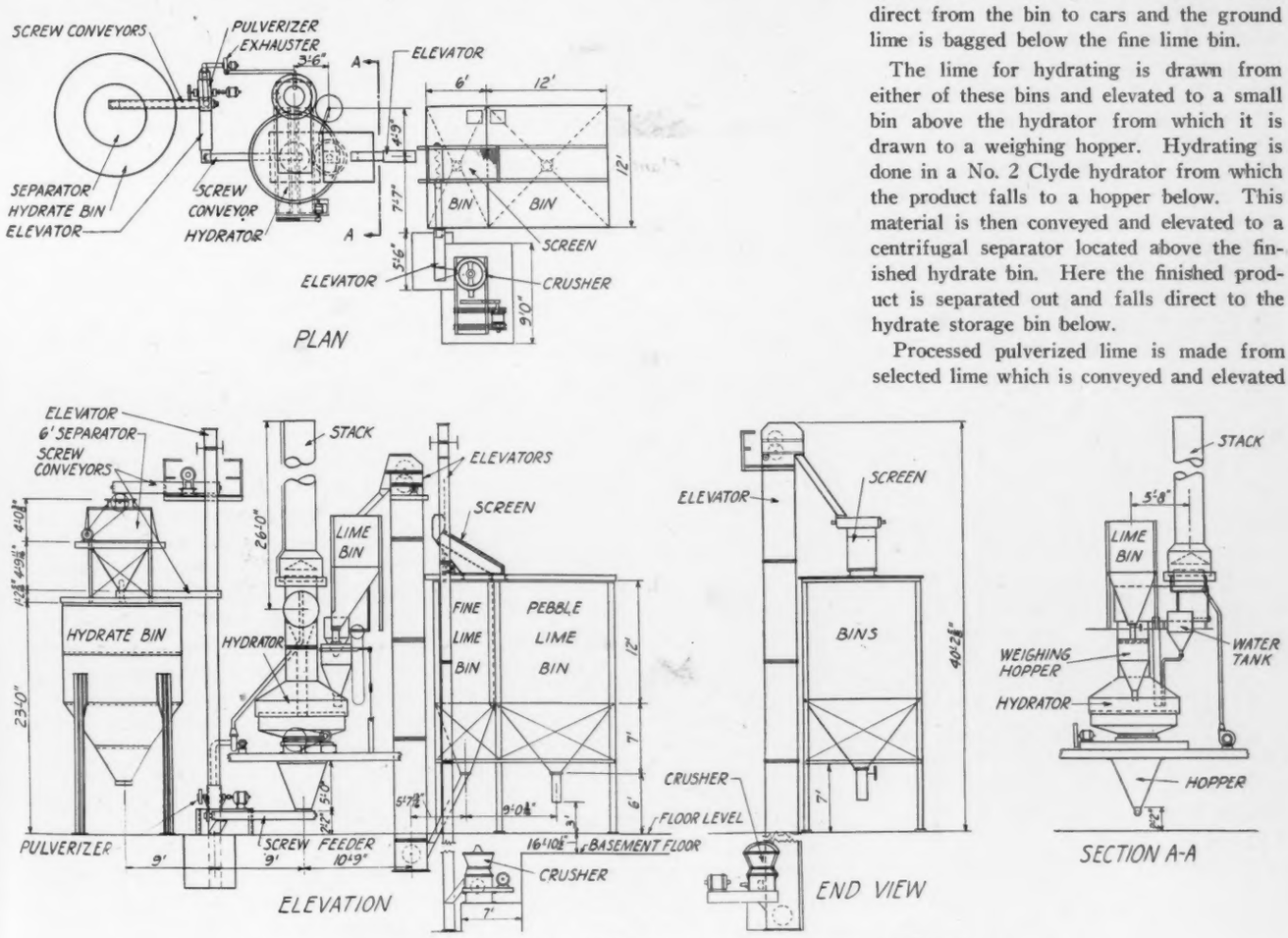
The quarry from which the limestone is obtained is situated on the mountainside about one-half mile from the plant and several hundred feet above the level of the top of the kilns. By means of a Riblet aerial tramway the broken stone is transported from the quarry to a bunker a short distance from the top of the kilns. The tramway is 3200 ft. long and is equipped with twelve 1600 lb. buckets. From the bunker the stone is drawn into cars and moved to the top of the kilns. The kilns are wood-fired.

General view of plant, aerial tramway from quarry at left

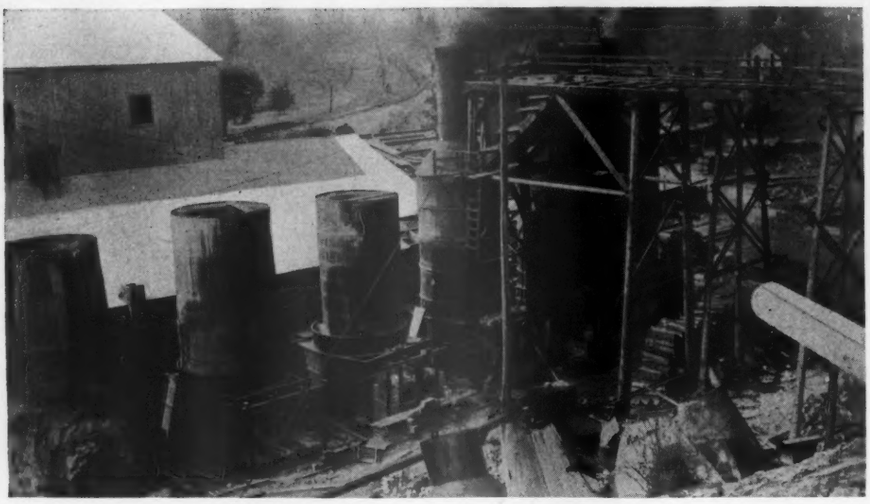
The burned lime drawn from the kilns is wheeled to a Sturtevant crusher from which the crushed product is carried up by a steel-cased bucket elevator. This elevator discharges to a screen from which the pebble lime and fine lime are spouted to their respective bins. The pebble lime is loaded direct from the bin to cars and the ground lime is bagged below the fine lime bin.

The lime for hydrating is drawn from either of these bins and elevated to a small bin above the hydrator from which it is drawn to a weighing hopper. Hydrating is done in a No. 2 Clyde hydrator from which the product falls to a hopper below. This material is then conveyed and elevated to a centrifugal separator located above the finished hydrate bin. Here the finished product is separated out and falls direct to the hydrate storage bin below.

Processed pulverized lime is made from selected lime which is conveyed and elevated



Arrangement of plant of Idaho Lime Co., near Bossburg, Wash.



View of kilns during reconstruction

from the storage bin, pulverized, and finished by a special air separation process in equipment furnished by the Union Iron Works, Spokane, Wash.

Electric power for the operation of the plant is furnished by the Washington Water Power Co. General Electric, Fairbanks-Morse, Century and Westinghouse motors are used. Drilling in the quarry is done with Gardner-Denver rock drills, using air furnished by a Worthington compressor.

J. H. Evans is president and general manager, B. B. Evans is secretary-treasurer and H. A. Croonquist is superintendent.

Hydrating plant and warehouse nearing completion

Mineral Wool Industry in Indiana

MINERAL WOOL is a fibre produced by melting rock to a glasslike condition and blowing the glass into fine white woollike threads. It is obtained from two kinds of rock in Indiana; one containing silt, clay and silica, with smaller amounts of lime and magnesia, and the other a more highly calcareous rock which may carry a small amount of magnesia. The latter is used as a flux to assist in the melting of the former. The alumina-iron-silica content is normally equal to the lime-magnesia content, but a considerable range is possible.

The wool rock occurs principally in Wabash, Huntington and Grant counties in the northern part of the state, and in Monroe, Lawrence and Washington counties in the southern part. It is normally fine grained and laminated, with an apparent specific gravity of from 1.75 to 2.50. Twenty samples showed an average analysis of 31.37% silica-alumina-iron and 31.9% lime-magnesia.

The raw material is converted into slag in a water-jacketed kiln or cupola in a manner similar to the production of pig iron, usually with coke as fuel and with forced draft. Temperatures ranging from 2500 to 3800 deg. F. have been used, depending upon the raw materials. Electrically heated cupolas have also been used successfully. A cupola 7½ ft. in diameter and 16 ft. high has a capacity of 1000 lb. per hour.

The bottom of the cupola is covered with a layer of wool rock. A layer of coke is then placed on the surface of the wool rock. A mixture of wool rock and flux rock is next added, then a layer of coke, this method of filling being continued until the cupola has been charged to the top. The fuel is then ignited and as the wool rock is melted near the bottom of the cupola the rock above settles downward into the zone of melt. The cupola may be fired continuously for two or even three weeks before the accumulation of impurities in the lower part makes cleaning necessary, the period of continuous operation depending upon the impurities of the fuel and the raw materials used.

Steam is used to throw the molten glass into fibres. As a small stream of molten glass issues from a small opening near the bottom of the cupola, a jet of steam from a small opening under a pressure of 85 to 100 lb. is directed against the descending stream of molten glass, which is thrown into long white, threadlike fibres. These fibres are allowed to settle in a long enclosed room, where the accumulated mass resembles a bank of freshly fallen snow.

Analyses of samples of mineral wool show a considerable variation in composition, ranging from 22 to 49% silica, 5 to 15% alumina and iron, 21 to 68% lime, and 4 to 18% magnesia. Silica and alumina are necessary constituents. Iron, which ranges from 2 to 6%, is important in lowering the fusion point, as are also lime and magnesia.

Mineral wool has been made in Indiana since 1899. In northern Indiana there are two plants at Wabash, three at Alexandria, one at Yorktown and one at Lagro. In southern Indiana there is a plant at Campbellsburg and another at Salem, both in Washington county. Mineral wool made from slag and rock is manufactured at a number of other points: Webber Cement Insulation Products Co., East Chicago, Ind.; Johns-Manville Corp., Waukegan, Ill., and Manville, N. J.; United States Mineral Wool Co., Netcong, N. J.; and Columbia Mineral Wool Co., South Milwaukee, Wis. Its principal use is as an insulating material.

Abstract of an article by W. N. Logan, state geologist, Indianapolis, Ind., given at the February, 1932, annual meeting of the Mining and Metallurgical Engineers at New York City.

Lime Production in Canada

PRODUCTION of lime by Canadian producers amounted to 23,972 tons in December as compared with 27,988 tons in November and 32,334 tons in December, 1930, according to a statement issued by the Dominion Bureau of Statistics at Ottawa. During the month under review operators in Ontario produced 10,035 tons or 41.9% of the Canadian total and Quebec producers 8822 tons or 36.8%. The remainder of the month's production came from kilns in British Columbia, Nova Scotia, New Brunswick, Manitoba and Alberta.

Phosphate Rock in 1930

A BULLETIN, phosphate rock in 1930, has been issued by the U. S. Bureau of Mines, giving detailed information on phosphate rock in the United States and some information on foreign countries.

Improved Grinding Methods in the Lehigh Valley District

By Earl C. Harsh
Associate Editor, Rock Products

SEVERAL MONTHS AGO an installation which should be of considerable interest to the portland cement industry was made in the Lehigh Valley district for the pulverizing of cement raw materials. This installation was by the Babcock and Wilcox Co., New York City, at the plant of the Whitehall Cement Manufacturing Co., Cementon, Penn., near Allentown, and was for the purpose of demonstrating a new type of pulverizer in which the material is reduced in one operation to the required fineness for burning in a rotary kiln. The pulverizer is operated in closed circuit with an air separator and the results obtained have been quite remarkable, if not revolutionary. The principle of grinding used in this mill corresponds to that of a ball bearing, there being no centrifugal force employed. Any inequalities in the size of the feed are absorbed through coil springs which bear directly on the top grinding rings.

Cement rock direct from hammer mills (1½-in. and under) has been reduced to a fineness of 90% through 200-mesh with a power consumption of 9.3 kw. hr. per ton, or only about one-half that usually required. This has been done at the rate of approximately 35 tons per hour in one unit. Although the unit has not been operated long enough to have complete figures on wear, the present indications are that the maintenance costs will also be very low.

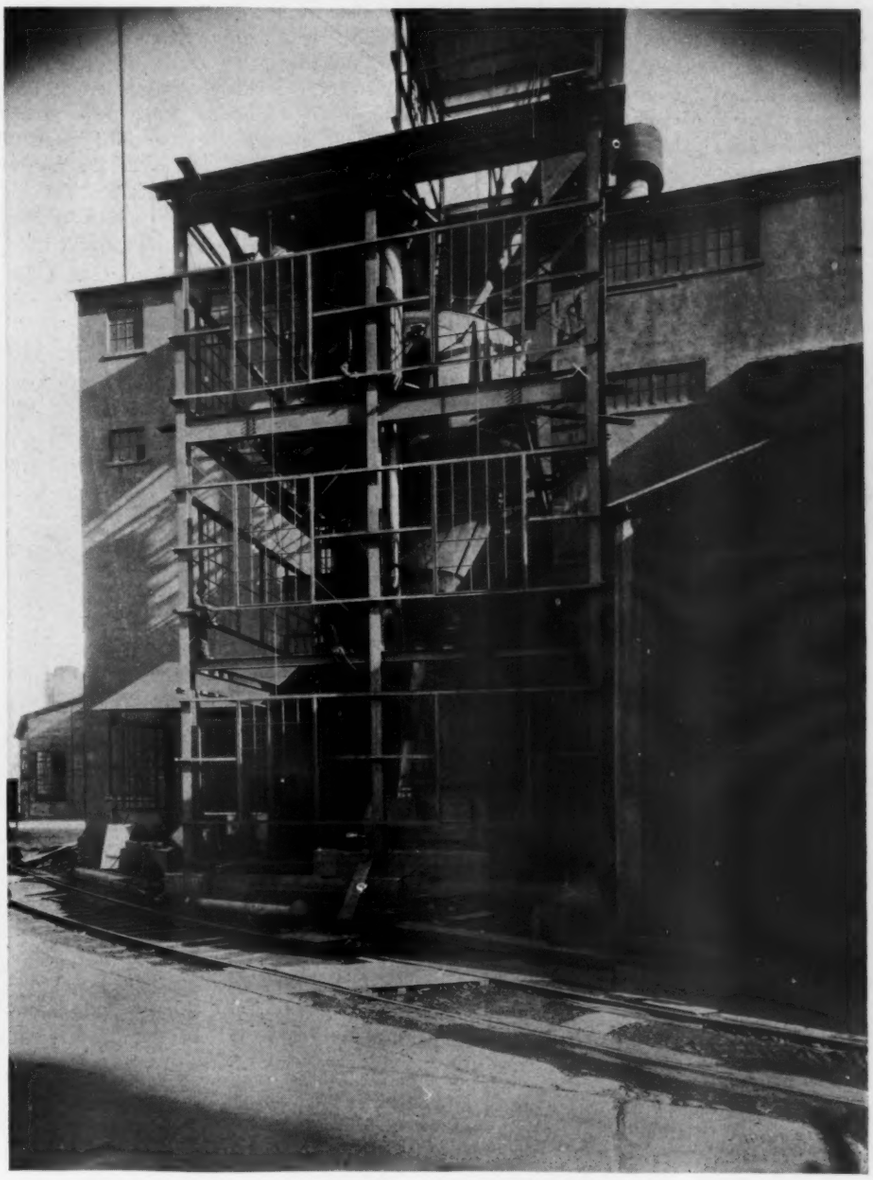
The installation was set up alongside the present raw grinding department, which consists of a rather typical combination of ring-roll mills and tube mills, in a space measuring approximately 23 by 25 ft. The feed is limestone which has passed through a No. 9 gyratory crusher, hammer mill and rotary dryer, and is taken from one of the bins supplying the original mills. A 30-in. Schaffer poidometer driven by a 3-hp. variable speed motor is used to feed the material to the pulverizer.

The material discharged from the pulverizer is carried up by a 20-in. bucket elevator to a 16-ft. Sturtevant air separator located above the mill. The tailings from the separator are spouted back to the pulverizer, while the fines are spouted to the feed hopper of a 7-in. Fuller-Kinyon pump and carried through a 5-in. line to the kiln feed bins.

The figures covering the present operation show that at a feed and discharge rate of 35 tons per hour some 150 tons of material per hour are returned as tailings by the separator and recirculated, making a total of 185 tons of material per hour through the mill and separator. The mill production is greater than anticipated when the installation was made. At 39 tons finished product per hour there was no evidence of the mill filling up, but continuous operation at this and higher rates was limited by elevator capacity. However, it is believed by those operating the mill that a larger elevator and an even greater circulating load would show higher capacities than those obtained to date.

The mill discharge shows a fineness of 24% minus 200-mesh and 29% minus 100-mesh, while the separator tailings show 12% minus 200-mesh and 18% minus 100-mesh. The finished product is 90% minus 200-mesh and 97% minus 100-mesh. The temperature of the finished product was some 25 to 30 deg. F. above the temperature of the feed.

Each of the units in the installation is



New pulverizer and air separator installation before being housed

individually motor driven and the motors are connected with recording and indicating meters in such a way that the power consumption of each unit may be obtained.

Power Requirement

The pulverizer is driven by a 400-hp. motor and according to the operating figures requires an average of 275-kw. or 7.8 kw. hr. per ton of finished material.

The elevator is driven by a 30-hp. motor and the separator by a 60-hp. motor and according to the readings these require together an average of 52.5 kw. or 1.5 kw. hr. per ton. The operation of pulverizing then requires a total of 9.3 kw. hr. per ton.

The Fuller-Kinyon pump handling the finished material is driven by a 30-hp., 1200-r.p.m. motor and the air compressor supplying it by a 50-hp. motor, both consuming an average of 42 kw. or 1.2 kw. hr. per ton for the transportation of the finished material. An Ingersoll-Rand two-cylinder vertical compressor, V-belt driven, by a General Electric motor supplies compressed air.

The grinding is done with little vibration or noise and the whole operation is practically dustless. The feed hopper of the Fuller-Kinyon pump is connected by a pipe with the dust-collecting system of the plant to prevent any accumulation of pressure at that point. The whole installation is of substantial steel and concrete construction and pleasing appearance.

Features of Pulverizer

In addition to low power consumption and expected low maintenance, the pulverizer has a number of distinctive features. It requires small floor space, about one-half, as compared with tube and compartment mills. The cost of installation is low. There are no heavy bearing pressures in the mill and no bearings to be lubricated in the grinding chamber. The grinding pressure is independent of the speed and is adjustable while in operation. It is stated that the fineness of grinding is not affected by wear as the grinding elements wear spherically.

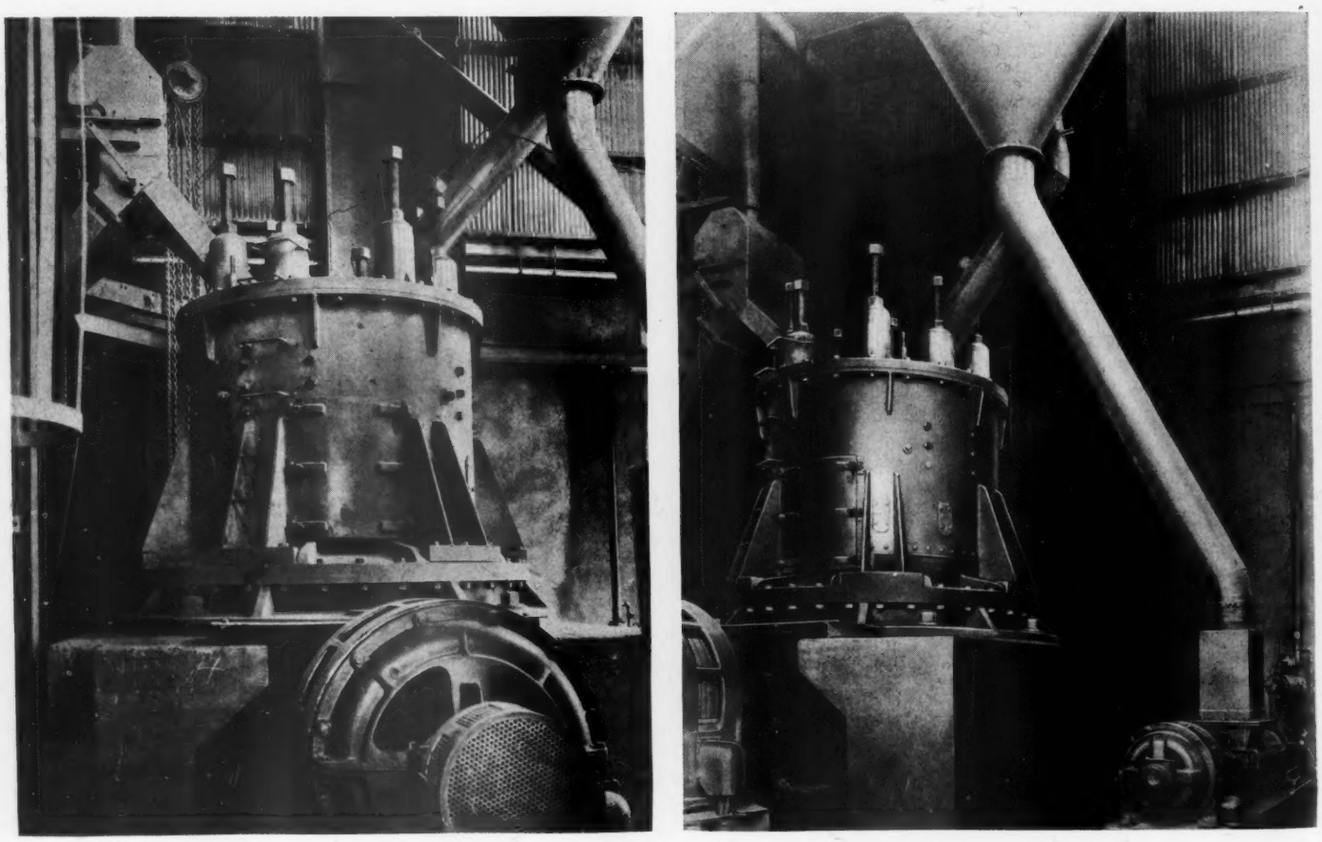
The construction of the mill is clearly shown in one of the accompanying illustrations. The grinding is done by three sets of balls and grinding rings arranged as shown. The feed drops to a rotating table which is fastened to the intermediate grinding ring and the tailings from the separator fall to the same table and are mixed with the new feed. Centrifugal action throws this material into the path of the inner set of balls, where the first stage of grinding is done, and then to the outer set for the second stage of grinding. From there it falls through an adjustable ledge gap to the lower set of balls for the third stage of grinding. A set of blades at the bottom sweeps the pulverized material to the discharge outlet. There are no screens or fans and no classifying is done in the mill itself.

In this particular mill, known as a No. 60-38, type B, the top inside grinding ring has a diameter of 38-in. center to center of balls, while the outside grinding rings have a diameter of 60 in. center to center of balls. The top inside set of balls consists of nine 12-in. balls, while twenty 9¼-in. balls are used in each of the two outer sets.

Pressure is applied independently to each of the top rings by means of four heavy coiled springs and adjusting screws extending up through the top plate of the mill. The grinding pressure is thus adjustable to meet any conditions of grindability of the material and to compensate for wear and may be easily changed while the machine is in operation.

The balls are of forged steel, the top rings and intermediate grinding ring are of Adamantine and the bottom grinding ring is of Elverite. Measurements of the wear to date, after operating about 1000 hours and pulverizing about 35,000 tons of limestone, indicate that 4 to 5 months of operation may be expected before any repairs will be necessary.

The two top rings and the lower grinding ring are stationary, while the intermediate ring revolves between them. The intermediate ring is not attached to the central shaft but is entirely free and is driven by means of lugs on a spider at the top of the vertical shaft. Thus, all of the weight of the grinding elements is carried directly by the frame of the mill and does not have to be carried on any of the bearings. The comparatively light weight of the spider and



Two views of new pulverizer which operates on the principle of a large ball bearing

shaft is carried on roller thrust bearings near the bottom of the shaft.

The mill is comparatively slow speed and grinding is done directly between balls and horizontal grinding rings. There is no lifting of the grinding elements as in tube and compartments mills, which is probably one of the reasons for the low power consumption of this pulverizer.

A feature of the mill is that all bearings are entirely outside of the grinding chamber. This particular mill has a double gear reduction consisting of one set of spur gears and one set of bevel gears completely enclosed in the base and arranged for forced-feed oil lubrication. The shafts are equipped with roller bearings and oil is fed to each bearing and to the faces of the gears. Rollway, Hyatt and S.K.F. bearings are used. A pump, chain driven from the driving countershaft, circulates the oil from the base to the bearings. Another detail is the use of a very small amount of air from the compressed air line to prevent any dust from the grinding chamber passing out around the central shaft at the bottom of the grinding chamber.

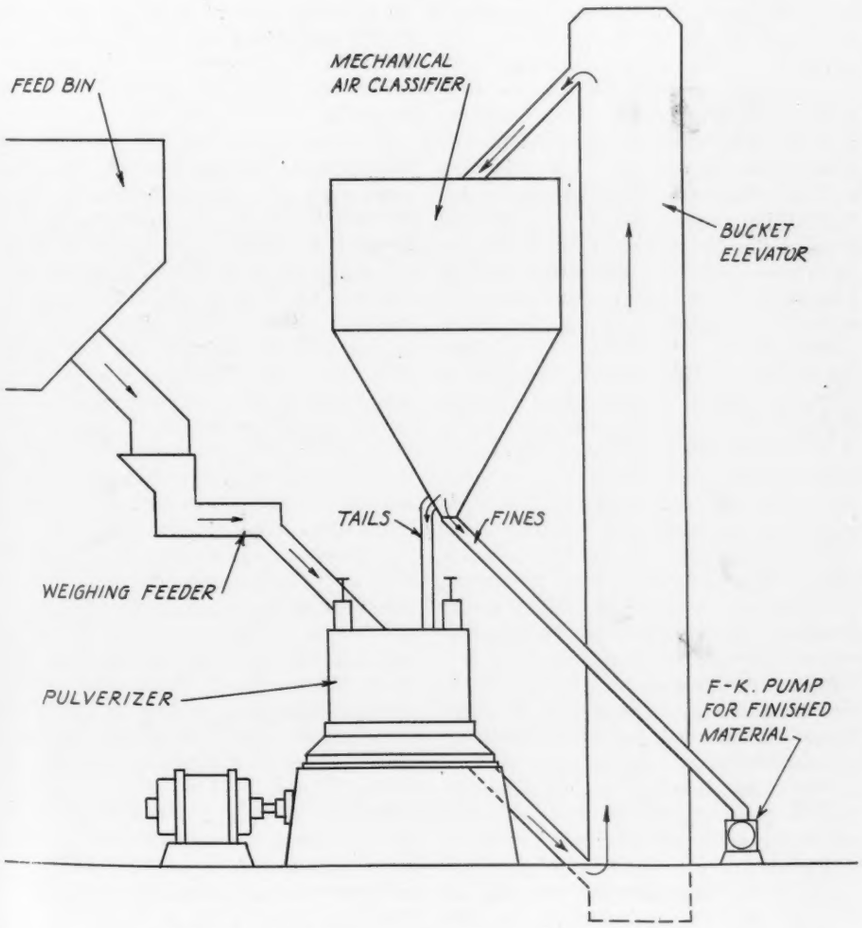
The pulverizer is driven by a 400-hp., 720-r.p.m., General Electric slip-ring motor connected to the driving shaft by a flexible coupling. The gearing within the mill base reduces the speed of the central shaft to approximately 80 r.p.m. The mill can also be furnished with a vertical synchronous motor mounted direct on the central shaft, thus doing away with all gearing.

A large number of pulverizers of this same general construction have been used for pulverizing coal, the largest of these being a No. 82-60, type B, mill used at the Kips Bay Station of the New York Steam Corp. This has an 82-in. diameter outside grinding ring, pulverizes 54 tons of coal per hour, and is driven by a 2200-volt synchronous motor mounted on the vertical shaft.

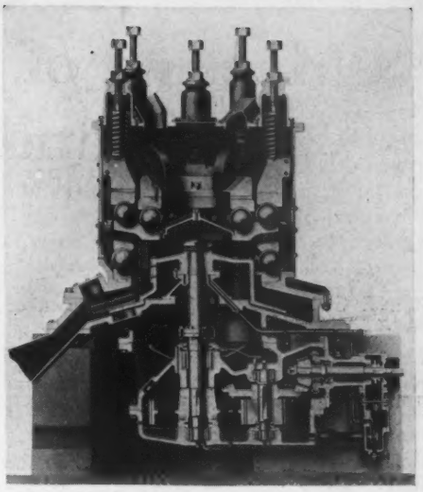
It is intended to demonstrate the mill's performance on clinker grinding at the Whitehall plant within the next few months and the results of that will undoubtedly also be of very general interest.

Relations Between Gypsum and Brushite

X-RAY POWDER photographs reveal a marked similarity in data for gypsum ($CaSO_4 \cdot 2H_2O$), brushite ($CaHPO_4 \cdot 2H_2O$) and a double salt of these two, in a 1 : 1 proportion, called *ardealite*, F. Halla reports. The resemblance between gypsum and brushite is much closer than available crystallographic data would indicate.—*Chemical Abstracts.*



Details of pulverizer and air separator installation



Cross-section of pulverizer showing details

Belgium Cement Exports in 1931

DURING 1931 Belgium exported 7,587,-918 bbl. of cement, compared with 11,-285,867 bbl. exported in 1930, a decline of about 21%, the Bureau of Foreign and Domestic Commerce reports. The total drop was somewhat offset by increases in shipments to the Netherlands and Morocco; the former was the most important foreign purchaser in both years, taking 1,980,639 bbl. in 1930 and 2,185,767 in 1931, a rise of about 11%. The next largest customer in 1931 was Great Britain, whose purchases dropped from 1,406,264 bbl. in 1930 to 1,106,858 in the following year. The largest proportional decline was an 80% drop in shipments to the United States, which fell from 359,126 bbl. in 1930 to 80,516 in 1931. Shipments to Argentina and Brazil fell by about 75%; those to Argentina came to 964,434 bbl. in 1930 and 260,956 in 1931. Sales to Brazil were much smaller.

Approve Pumice from New Producer as Aggregate

THE USE of pumice mined on the Napa mountain four miles east of Napa, Calif., for the construction of postoffice buildings at Sacramento and Stockton, was recently approved, it is reported by Andrew Cavagnaro, Sacramento contractor, who conferred with officials of the Pumice Products Co., newly organized Napa concern.

The pumice will be used on these two buildings in the concrete. It is expected that close to 60 carloads of the pumice will be required for these two buildings.

Napa's county pumice deposits are largely found on the John Pearl ranch on Napa mountain.

The Pumice Products Co. is composed largely of Oakland interests. It is mining the mineral on a royalty basis and has installed a crushing plant and bunkers.—*Napa* (Calif.) *Journal.*

Meeting of the Association of German Portland Cement Manufacturers

Abstracts of Papers Presented

(Specially Written for Rock Products)

THE CUSTOMARY general meeting of the Association of German Portland Cement Manufacturers was held in Berlin on March 15 and 16. The first day was devoted chiefly to the disposal of business problems of the association as well as to technical reports of the committees. On the second day a series of scientific discourses was held, which was of general interest, as the following abstracts prove:

Reaction Between Lime and Silicic Acid, Alumina, Iron Oxide

Dr. G. Haegermann: The reactions between CaO on one hand and SiO_2, Al_2O_3, Fe_2O_3 on the other hand at the temperature of sintering are not yet fully cleared, wherefore a presentation in pure state of all compounds acceptable in cement and an examination of their characterstics was carried through. Treated were tricalcium silicate, with a hydraulic modulus of 2.8, compared to 2.2 of the cement; furthermore dicalcium silicate in cements with insufficient lime content, and also the very important tricalcium aluminate (hydraulic modulus 1.65), and finally the tetracalcium aluminate ferrite.

(1) Tricalcium silicate, $3CaO \cdot SiO_2$, disintegrates at 1900 deg. C. with separation of lime, which causes phenomena of unsoundness. The $3CaO \cdot SiO_2$ was produced in a three-hour heating of the primary materials to 1550 deg. C. whereby the statements of W. Dyckerhoff were confirmed that $3CaO \cdot SiO_2$ is produced only above 1450 deg. C., in so far as no other substances are present at the same time. In the presence of alumina and iron oxide, on the contrary, $3CaO \cdot SiO_2$ is produced within the customary burning temperatures.

Between 1000 and 1500 deg. C. the stability of the tricalcium silicate is but small, since it is inclined to separate into CaO and $\beta 2CaO \cdot SiO_2$. Therewith the assertion of Michaelis is confirmed, according to which the separation of lime in the ignition of clinker is a consequence of the disintegration of $3CaO \cdot SiO_2$.

Haegermann presented passable samples of boiling specimens for volume consistency of $3CaO \cdot SiO_2$. The setting started after six hours and was concluded after ten hours; was therefore decidedly slow. Additions of alkali sulphates, $CaCl_2$, KCl, $AlCl_3$, $MgCl_2$ accelerated the set, whereas with addition of borax or bichromate of potassium retarded the set.

(2) Tricalcium aluminate disintegrates in fusion into an eutectic of the following composition: $3CaO \cdot Al_2O_3 + 5CaO \cdot 3Al_2O_3 + CaO$ (free). The fusion temperature lies, in agreement with Rankin, at 1535 deg. C. The $3CaO \cdot Al_2O_3$ can be produced easily by tempering at 1350 deg. C. The $3CaO \cdot Al_2O_3$ also forms a volume consistent mortar. Under temperature rises of 85 deg. C. a turbulent fixing of water occurs in the hydration, whereby it was determined that the originally hardened test pats become mud-soft again and then harden, but very sluggishly.

Tricalcium aluminate tested according to standard specifications showed after 28 days storage in water a strength of 3 kg. per sq. cm. whereas in combined storage a strength of 10 kg. per sq. cm. was the result. Additions of gypsum and calcium chloride retard the hydration; by addition of 5% gypsum unsoundness starts in water storage. If $3CaO \cdot Al_2O_3$ is pulverized anew daily and mixed again with water, gradual hardening results. The previously mentioned fusion of the eutectic is a rapid set. A dicalcium aluminate does not exist.

As to what concerns the Jaenecke compound $8CaO \cdot 2SiO_2 \cdot Al_2O_3$, such does not arise at 1600 deg. C.; rather, the product always contains free lime, which in slow cooling is reabsorbed in such a manner that $5CaO \cdot 3Al_2O_3$ changes into $3CaO \cdot Al_2O_3$. The stopping point in the cooling-off curve also is no exact proof for the existence of the Jaenecke compound. If the Jaenecke mixture is heated to 1600 deg. C., then arise: $2(3CaO \cdot SiO_2)$, $3CaO \cdot Al_2O_3$, $5CaO \cdot 3Al_2O_3$ and free lime, which latter is detectable by the Emley method. The heretofore deviating result of American investigations is explained thereby, that entirely other conditions are made in tempering, since namely at 1450 deg. C. the free lime is taken up in the aluminates and $2CaO \cdot SiO_2$, $3CaO \cdot SiO_2$ and also $3CaO \cdot Al_2O_3$ are formed. Greater quantities of $2CaO \cdot SiO_2$ are formed than when the tempering is done at 1175 deg. C. Jaenecke's compound does not exist in any case.

(3) So far as concerns the iron oxide bearing constituents, it should be remarked first of all, that the dicalcium ferrite plays no role in portland cement, but that it is possibly a constituent of the so-called iron ore cement, in which the content of Al_2O_3 and Fe_2O_3 is changed from that customary in portland cement. In spite of manifold doubts it has been detected that celit is identical with $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$. In the tempering of this compound from 3 to 4% more CaO is obtained than corresponds to the formula; this is, however, present presumably as $3CaO \cdot Al_2O_3$. As a further proof of the existence of the celit in the specified composition, the fact is that at 1320 deg. C. free lime is separated off from a mixture of $2CaO \cdot Fe_2O_3$ and $3CaO \cdot Al_2O_3$ so that the tetra salt must form.

In any case tricalcium silicate is the actual supporter of hardening, whereas the aluminates are necessary as hardening exciters. Gypsum and aluminates do not work with each other, while a 3% addition of calcium chloride works out favorably with the silicates.

The Heat-Technical Principles of Cement Burning

Prof. Dr. W. Eitel subjected the mathematical methods used in present-day practice for establishing heat balances in cement kilns, to a re-examination whereby new determinations yielded higher values than known heretofore. Only the values obtained by W. P. White agreed with the more recent measurements of the specific heat of clinker.

Much more involved, however, becomes the problem of the specific heat of the raw meal, since only values for the individual constituents are known. Alumina especially provides difficulties owing to the endothermic heat tone which sets in at 510 deg. C. through dehydration of the meta-kaolin substance. This endothermic effect so far has always been neglected and is considerably greater than has been assumed. The same holds for the exothermic effect, which sets in at 950 deg. C. in the meta-kaolin substance, the cause of which is regarded as the disintegration of the kaolinite substance into its oxidizing constituents; an effect which starts below 950 deg. C.

In the raw cement meal, the exothermic effect of the meta-kaolin disintegration overlaps at 950 deg. C. with the exothermic reactions of formation of the lime silicates and lime aluminates in the clinker. The fundamental values of Nacken embrace the sum of all heat tones and now the question is to determine proportions of the individual constituents on this total of exothermic heat effects.

Eitel produced a new kind of heat flow chart for the ideal process of cement burning and furthermore fixed the differences between theory and practice in the direction that in reference to the latter in place of 0 deg. C., 20 deg. C. is to be taken as the

starting temperature; that the moisture in the raw meal and the admixture of $MgCO_3$ to lime are to be considered.

Hydraulic Hardening as Surface Reaction

Prof. Dr. H. Kuehl, in leaning to the theory of Michaelis, treated the hardening of cement as a colloid-chemical problem. He quoted as an example for a colloidal shrinking process, that a ground lime-fat vitreous fusion, which hardened with SiO_2-free potash lye, showed after four weeks x-rayographically no crystal formation, and that the tensile strength was 21.6 kg. per sq. cm. after three days. The calcium aluminates also harden colloid-chemically, of which alumina cement is the best example. The entire processes appearing in shrinkage and swelling cannot be explained at all by assumption of a crystalline hardening; they are rather out-spoken surface reactions which can result only when the size of particles does not exceed $0.\mu$. But colloids should not be confounded with the conception "amorphous," since it is entirely possible that they possess fine-crystalline structure.

It appears, however, that the first new formations in hardening of the cements are obviously amorphous. Swelling silicatic binding agents are, apart from portland cement, always silicates low in lime, whereas in the portland cement, through a primary process, a system must be produced that dissolves a portion of the lime.

Kuehl and his co-workers treated coarse cement meal with the same reaction liquid, which forms in the mixing of cement, and they obtained through careful separation three phases, namely: reaction liquid—new formation—coarse cement meal [cement grits].

The reaction liquid for portland cement was saturated lime water; for alumina cement it was pure water; and for blast furnace slag it was lye which was obtained by treatment of ground blast furnace slag with distilled water and contained among others calcium sulphide in solution. Besides, in this case lime solution was added by diffusion.

(1) In portland cement, after eight hours, the content in Al_2O_3 of the new formations was double that of SiO_2, whereas originally the cement had three times as much SiO_2 as Al_2O_3. After 20 days, the original proportion had reestablished itself in the new formations. The concentration of lime in the reaction liquid, as it results in the mixing of cement, can be explained only through a disintegration of $3CaO{\cdot}SiO_2$, which signifies a confirmation of the views of Michaelis.

Also, in the aluminates the result first of all is a solution, from which hydro-aluminates again separate. The hydration of $3CaO{\cdot}Al_2O_3$ proceeds very rapidly but not as turbulently as that of $3CaO{\cdot}SiO_2$. On the other hand, the Brownmiller compound with its ferritic portion hydrates extremely sluggishly.

The lime dissolved out of $3CaO{\cdot}SiO_2$ is obviously replaced by entrance of water so that the structure is preserved intact. But finally a disintegration results anyway with the formation of hydro-silicates, which envelop the cement granules with a layer of gel.

(2) In alumina cement all monocalcium aluminate enters turbulently in solution with the formation of dicalcium hydro-aluminate and $Al(OH)_3$. Later, again, gel separates from the original colloidal solution. The gel is subject to ageing, in that there results gradually a conversion into crystalline compounds. In all reaction products there is determinable only an exceedingly small SiO_2 content.

(3) When it concerns only blast furnace slag with sufficiently high lime content, the alumina shows a tendency to the formation of lime-fat hydro-aluminate, whereas silicatic compounds on the other hand furnish lime-lean hydro-silicates. Depending on the lime concentration in the liquid phase, there result equal new formations as in portland cement and alumina cement, which always possess colloidal character.

In all cements the aluminates enter into solution, hydrate and separate out as colloidal new formations. On the other hand, the silicates take up water from the system and hydrate under delivery or reception of lime to a colloidal gel mass, which encloses the reacting granule.

Concerning Various Kinds of Water Binding in Cement

Prof. Dr. Nacken: After the problem of the constitution of portland cement is considered sufficiently solved, it is valid now to clear up the processes in the setting of cement. It is important to ascertain the reactions between cement and water, furthermore to determine the chemical new formations and finally to investigate the chemical and physical behavior of these new formations.

All water-bearing substances can be divided into hydroxides, hydrates, zeolites, water-bearing glasses and gels; in each case the water-binding results differently. Moreover the individual groups differ according to swelling ability, exchangeability of the basic constituents, colorability, and the behavior respective to ageing. Thus exists, for example, between gels and zeolites with regard to the swelling ability the difference that zeolites are saturated from water-bearing solutions and do not swell, whereas in the gels the swelling ability decreases gradually with age, in so far that there is no provision for renewing this property through chemical dispersion mediums. Whereas gels release water gradually, this does not result in hydrates and zeolites. Probably all kinds of possible water binding appear in cement.

The investigation has to follow either the analytical or the synthetic course. In the first case steam tension plays an important role in that either the heating curve is at constant pressure or that the volume pressure curve is obtained isothermic, that is, at constant temperature. The isobaric curves always show a break when a new hydration stage arises or disappears, for which self-evidently the equilibrium adjustment must be awaited. But sometimes the decomposition proceeds in such a manner that the substance is placed under high vacuum and the course of the releasing of the water is determined at definite time intervals.

So far as concerns the steam tension curves, the relations conditioned by the phase rule must be fulfilled which probably proves correct for the hydroxides and hydrates, but not for gels. Normally the zeolites are in stable equilibrium, which conditions a displacement in water content only through heating or application of a vacuum. In gels there result no sharp characteristics curves, wherefore from case to case breaks appearing in the curves must be cleared up.

In examination by the synthetic method those phenomena were tested which occurred in the mixing of cement with water, where the generation of heat is to be regarded as a sign of activity. In gypsum-free cement there appears at the start a very important heat tone, which then declines again, and finally increases gradually again. This process can be regarded as proof that first of all the silicic acid places itself in brine-form around the particles of clinker, and thereupon allows the water to diffuse further. The temporary weakening of the heat tone points to the strengthening of this gel layer. Strong electrolites flake out the forming silicic acid brine. On the other hand, soda additives change the reaction process fundamentally and therewith the curve obtained, since the silicic acid in this case converts into easily soluble salts, so that restraint through the film of gel cannot arise.

That the gels are the true bearers of the cementing follows from the swelling tests, even though to be sure the possibility exists also that it concerns zeolites. This problem can, however, be decided only when the densities of the zeolites are known; but these are hopeless tests, since the investigation would have to be made in some kind of liquid, which is again absorbed by the zeolites.

In order to trace the setting processes, Nacken selected finally still another course, which consists of the determination of the di-electric constant. This has for pure water the value of 80, whereas hydrates show smaller values, so that the di-electric constant decreases in the same measure as hydrate formations. This constant increases in gels rich in water; however, it decreases again when the water is fixed (as for example fixed in the opal). For cement, the curves show at the start an increase over the value of 80, whereupon there follows a gradual decrease, even though occasional strongly jump-like tendencies appear. But this test result is in any case to be valued

as proof that a fixing of water results. Even though the slightest variations in the test requirements yield deviating results, the depicted basic tendency is an unmistakable one.

Limiting Sieve Lines and Modulus of Fineness of Aggregates

Dr. Hummel: The granule composition of the aggregates has been fundamentally obtained so far according to three methods:

(1) Lineal fixation of the gradation through sieves (Fuller curve, etc.)

(2) Areal fixation by means of limiting sieve lines.

(3) Valuation by aid of the modulus of fineness, or similar value.

Whereas the first process has been introduced especially for scientific investigation, the two other methods have won importance for building practice.

Hummel gave then first a chronological retrospect, in that he mentioned the labors of Fuller, then entered also into his areal orienting proposal from the year 1925, and furthermore treated the specifications of 1927 of the German Concrete Association and also the Government Railway specifications of 1928, in order to discuss finally the 1931 improved proposal of the German Committee for Reinforced Concrete, the limiting sieve lines of which conform generally with the proposal of the modulus of fineness of the year 1926.

The valuation of the granule composition according to the modulus of fineness has found general application, even though this does not possess unlimited validity, and Duff A. Abrams has pointed to the natural limits drawn by the workability. Also Hummel has investigated these limits of validity and has fixed differences for the diverse sizes of the granules and also for their moisture content.

The law of modulus of fineness to strength applies to such granule mixtures as possess the same or nearly the same figures of yield. Aggregates from a granule fraction or even from two granule mixtures, which show essentially other yield figures, drop out of the range of validity of the law.

By aid of the test results, Hummel showed how this knowledge is to be evaluated.

Therefore he favors in concrete control specifications, the admission of a specification which gives attention to the fluctuations in mixing which can arise as a result of moisture in the aggregates. The limiting sieve lines as well as the modulus of fineness possess their range of validity, whereas not one nor the other process should be proposed but both should be utilized, depending on the case.

Development of Pneumatic Conveying and Mixing in Cement Plants

Dr. K. A. Goslich: The fundamental differences consist of suction air, pressure air with slight excess pressure, and compressed air (5 to 6 atmospheres or 70 to 85 lb.). In the cement industry pressure air conveyance found application first for coal and ashes, whereas for the conveyance of slurry afterwards Mammut pumps and pressure vessel conveyance were used. The first Mammut pump was erected in 1899, whereas since 1912 to 1913 the conveyance of slurry with pressure vessels for various delivery heads has been introduced.

Only after that was the problem of pneumatic conveying of mealy materials solved. The meal must be mixed so intimately with the air that it flows like a liquid in the pipelines. Screws proved first of all impractical, since they were subject to great wear and again their purely mechanical resistance had to be overcome.

An improvement was brought about by the Roko conveyors, since in these the overpressure is taken up by a cell sluice provided above the screw, so that the screw then merely had to deliver and could therefore work with greater play. For the Cera pumps of the Polysius firm, conveying screws no longer are necessary at all, since the entire charging system operates with back pressure. After this problem had been solved, the same conveying arrangements were applied to the mixing of the raw meal through circulation in several containers.

Formation of Calcium-Silicate in Unhardened Lime Sand Mortar

H. BRINTZINGER and W. Bubam have reported on work undertaken to investigate the reason for the great solidity of antique mortar. There is definite proof that a reaction between $CaCO_3$ and SiO_2 does not take place. It should be more plausible to trace the content of soluble SiO_2 in old mortars to a clay content of the lime used or to more or less soluble weathered silicates in the sand. The gradual conversion of the original finely crystallized $CaCO_3$ into the harder and coarser modification is also a factor which increases the strength of the mortar works. A reaction between $Ca(OH)_2$ and SiO_2 on the boundary surface of the sand particles is still to be considered, particularly in the interior of walls where $Ca(OH)_2$ has been in contact with the sand for longer periods. That a very slow hardening actually takes place in the interior of compact walls has been proved. The interior of the 150-year-old fortification wall of Strassburg was still soft and fresh and that of the 300-year-old wall of Vienna still had a distinct alkaline reaction. Laboratory experiments were made to determine whether a reaction between $Ca(OH)_2$ and SiO_2 actually takes place. Amounts of SiO_2 rendered acid-soluble by the action of moist $Ca(OH)_2$ ranged from 0.58 to 9.82%, 0.83 to 16.88% and 0.90 to 21.95% for sands of different degrees of fineness, after 2, 4 and 6 months, respectively. The amount converted increases with the increase in boundary surface between sand and lime, *i.e.*, with decreasing grain size of sand as well as with the duration of contact. The rate of conversion gradually decreases; this is explained by the protective action exerted by the $CaSiO_3$ first formed on the surface of the sand grains. $CaSiO_3$ is formed only in the absence of CO_2 and in the interior of heavy walls it is reasonable that this condition should prevail sufficiently long for the formation of detectable amounts. From a large number of investigations of materials from strong medieval walls it is evident that the content of $CaSiO_3$ increases with the distance from the surface of the wall.—*Chemical Abstracts.*

Differences Between U. S. and Tyler Standard Sieves

PART of the rock products industry uses U. S. standard and a part Tyler standard sieves, and the differences are so slight that they are not usually taken into account. That is, a No. 14 Tyler, 0.046-in. opening, is taken as the equivalent of the No. 16 U. S. standard, 0.0469-in. opening. The difference is usually less than the tolerance permitted the makers.

Nevertheless it is evident that a 0.0469-in. opening will pass some grains that a 0.046-in. opening will not, and that it will report a finer product than the other. In "Sieve Analyses of Refractory Materials," a paper delivered before the American Refractories Institute, R. F. Ferguson discusses the differences between the two systems and gives a formula for comparing their sieved products. It is $V : V'$ as $S^4 : S'^4$, meaning that the volumes, V and V', are to each other as the fourth power of the widths of the openings, S and S', of the sieves. In the case of the 0.046 and 0.0469 openings, the ratio would be as 0.00000448 and 0.00000484, the first being 92.3% of the second. This formula holds with all materials in which the particles of identical shape and density vary by some uniform increment. The writer says that these conditions will be approximated in a commercially ground material within a narrow range of particle sizes so that the formula can be used to compare the products of sieves with openings of nearly the same size. The following table from the paper gives the differences in products for the most used sieves of both systems:

U. S. Standard series Sieve No.	% Passing	% Passing	Tyler Standard series Sieve No.
4	100	95.0	4
6	100	96.2	6
8	100	96.3	8
12	100	93.3	10
16	100	92.3	14
20	100	96.8	20
30	100	99.4	28
40	100	97.3	35
50	100	97.3	48
70	100	96.3	65
100	100	94.7	100
140	100	96.3	150
200	100	100.0	200

Written Versus Oral Warranty in Purchase of Rock Crusher

By Leslie Childs

GENERALLY SPEAKING, where machinery is purchased under a written contract of warranty, the terms of the latter cannot be changed or enlarged by any oral warranties made prior to the signing of the contract. In other words, in the absence of fraud, the written contract will prevail, and the courts will assume that it contains the entire contract between the parties.

The foregoing is elementary law, and without doubt the great majority of business men are familiar with its application. Yet, it is frequently overlooked when contracts are being entered into, and is a prolific source of after dispute. As an example of judicial reasoning on the subject, and the importance of having it covered when machinery is being purchased, the following recent case is in point:

Rock Crusher Purchased Under Written Contract

Here the defendant entered into a contract for the purchase of a rock crusher, paying one-fourth in cash and giving notes for the balance. The contract was in writing, and, among other things, contained the following warranty:

"Said machinery is purchased upon and subject to the following mutual and interdependent conditions, and none other, namely:

"We (plaintiff, seller) guarantee said machinery to be of first-class material and workmanship, and agree to replace, free of charge f.o.b. factory where made, any part which may within 90 days from date of delivery prove to have been defective when furnished, the broken or defective part to be returned to the factory where made for inspection when requested, charges to be prepaid by the customer."

Pursuant to the above contract, the defendant accepted the crusher and put it to work, and after a fair trial the crusher failed to crush sufficient rock for defendant's purposes. The crusher, so defendant claimed, would not handle more than from 100 to 130 tons of stone per day, and defendant's work required that it crush at least 200 tons of stone per day.

In this situation, defendant refused to pay the notes given for the balance of the purchase price, unless plaintiff would so change the crusher as to produce the amount required. The dispute that followed culminated in plaintiff filing suit on the notes, and the contract as written.

In defense, the defendant claimed that at the time of the purchase plaintiff orally warranted the capacity of the crusher to be 200 tons per day; that this representation and warranty was relied upon which induced defendant to make the purchase which he otherwise would not have made. Further, defendant claimed that plaintiff was informed of the purpose and need of the defendant, and made the alleged representation of capacity with full knowledge of the facts and the requirements of defendant. Defendant then set up a counterclaim for damages resulting from the failure of the crusher to perform according to the oral warranty.

Replying to this, plaintiff pointed to the written contract and the warranty that has been quoted, and called attention to the fact that the written warranty was all the warranty given. In the light of this, plaintiff objected to evidence of any oral warranty that would tend to change the terms of the contract.

The trial court held the terms of the written contract governed the case, and since defendant had not shown any breach thereof, rendered judgment for the plaintiff. Defendant appealed from this, and the higher court in reasoning upon the question presented and in affirming the judgment, in part, said:

Defendant Held Liable

"There is no denial of the execution of the written contract. It stipulates that the machinery was purchased on the conditions therein contained and none other. The only warranty was that the machinery was to be of first-class material and workmanship, coupled with the agreement to replace free of charge any part which might within 90 days from date of delivery prove to have been defective when furnished. . . .

"It is not pleaded that defendant notified plaintiff that any particular part of the machinery was defective when furnished, but only that it notified plaintiff that the crusher was not according to contract and would not do the work that plaintiff represented that it would do. Indeed, a careful analysis of the answer and counterclaim . . . shows that the defense was predicated entirely on the breach of the oral warranty that the crusher would crush approximately 200 tons a day.

"It is not pleaded that this representation or warranty was omitted from the written contract by fraud or mistake. The case is simply one where, in the face of a contract containing a specific warranty and excluding all others, defendant is relying on an oral warranty made prior to, or contemporaneously with, the execution of the contract. As this cannot be done, it is at once apparent that the answer and counterclaim . . . was not sufficient. . . . Judgment affirmed."

So ended the case, with the defendant being held liable on the purchase price notes. And, as an example of the possible danger in not having all warranties included in a written contract for the purchase of machinery, this decision is hard to beat. For the holding is in accord with the weight of authority, that oral warranties or representations made before, or at the time a written contract is signed, cannot, in the absence of fraud or mistake, be shown to vary the written terms. *Moral*, if any is needed, have *all* warranties reduced to writing when untried machinery is being purchased, in fairness to both parties and as insurance against after dispute.

Tennessee Phosphate Rock in 1930

THE state of Tennessee Bureau of Mines, Department of Labor, Nashville, has furnished a report covering phosphate rock operations in Tennessee in 1930.

The following table shows the production and value thereof:

PRODUCTION

	Product (long tons)			
County	Blue rock	Brown rock	Total product	Value of product
Giles		64,809	64,809	$ 268,957
Hickman		11,726	11,726	62,000
Lewis	41,968	1,368	43,336	170,460
Maury		472,938	472,938	2,388,648
Total	41,968	550,841	592,809	$2,890,065

SALES

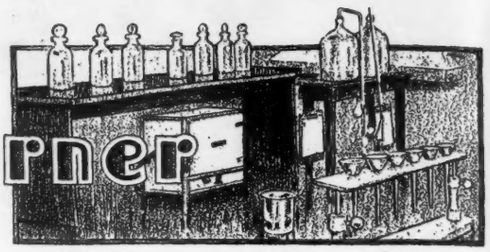
	(Long tons)			
	Blue rock		Brown rock	
County	Amount	Value	Amount	Value
Giles			52,509	$ 218,211
Hickman			11,053	65,000
Lewis	44,408	$176,405	1,223	3,362
Maury			420,956	2,112,654
Total	44,408	$176,405	485,741	$2,399,227

Total amount rock sold (long tons)	530,149
Total amount received for all rock sold	$2,575,632
Average amount received per ton for rock	$5.17
Number acres rock owned by operators	5,686
Number acres leased by operators	3,932
Average royalty paid per ton	$0.73
Average yield per acre in phosphate rock (long tons)	3,375
Average cost per ton to mine	$1.64

The amount and value of phosphate in Tennessee in 1930, as compared with 1929, was as follows, in long tons:

	1930		1929	
County	Amount	Value	Amount	Value
Giles	64,809	$268,957	58,177	$ 274,018
Hickman	11,726	62,000	14,681	77,819
Lewis	43,336	170,460	38,866	165,923
Maury	472,938	2,388,648	512,079	2,468,425
Total	592,809	$2,890,065	623,803	$2,986,158

The Chemists' Corner



Effects of Storage on Strength of Cement

By Katsuzo Koyanagi
Chichibu Cement Co., Ltd., Tokyo, Japan

IN the Chemist's Corner of the August 15 issue of Rock Products, Alton J. Blank reports his new findings upon storage of portland cement. He conducted tests on the effect of storage upon tensile strengths of 18 portland cements of nearly same chemical composition, and found that 9 cements show increased strengths in storage periods up to one month, 2 show also increased strengths in storage periods up to 14 days, while the others show decreases in strengths after a storage period of 24 hours.

The opinion of Mr. Blank on the storage of portland cement has changed a little since the year before, when he asserted with great self-confidence, in one of the discussions entered between us, in the Chemist's Corner of Rock Products, that "he had never found the strength quality of portland cement to be bettered upon storage once ignition losses had been increased through the absorption of atmospheric carbon dioxide and moisture."

Chemistry makes progress day by day; that which is believed today to be correct would remain no longer so tomorrow. So it is very dangerous for cement chemists to criticize the results of newly conducted experiments of others, without making a minute study on the subject.

The writer stated in an article, "Reply to the Article by Alton J. Blank on Ignition Losses," in the Chemist's Corner of the December 20 issue of Rock Products, 1930, that "storage of moderate length is effective in increasing the strength quality of cement, or at least it is not so harmful."

Since that time the writer has also conducted many tests upon storage of standard portland cement as well as high early strength portland cement. The tests can roughly be divided into two series; in the first series of the experiments (cements Nos. 1 to 6) the fresh ground cement was spread over a sheet of paper in the laboratory room, the thickness of the cement layer being about 4 in., stored there for several lengths of time till at longest 40 days. The setting times and tensile strengths before and after storage were tested. In the second series of the tests (cements Nos. 7 to 12) the fresh ground cement was packed in hemp bags, and stored for longer periods of time.

ANALYSIS OF CEMENT

Nos. of cement	Ig. loss	SiO_2	Al_2O_3	F_2O_3	CaO	MgO	SO_3	Hyd. modul.*
1	1.20	21.20	5.38	3.18	65.15	1.60	1.50	2.15
2	1.09	20.26	6.45	2.93	67.35	1.75	1.15	2.23
3-6	2.08	20.98	5.89	2.13	65.54	0.89	1.86	2.22
9-11	1.20	22.01	5.15	3.40	64.90	1.78	1.25	2.10
7-8	1.28	21.82	5.48	3.27	64.88	1.93	1.18	2.10
12	1.25	22.53	5.51	3.30	63.73	1.46	1.52	2.00

*Hyd. Modul. $= \dfrac{CaO - 0.7 \times SO_3}{SiO_2 + Al_2O_3 + Fe_2O_3}$

EXPERIMENT I

Cement samples were spread over a sheet of paper in the laboratory room, the thickness of cement layer being 4 in.

CEMENT No. 1

	Original sample	Periods of storage: 5 days	10 days	15 days	20 days	30 days	40 days
Initial set—	3 hr. 25 min.	4 hr. 00 min.	4 hr. 30 min.	4 hr. 33 min.	4 hr. 45 min.	5 hr. 36 min.	7 hr. 37 min.
Final set—	4 hr. 40 min.	6 hr. 00 min.	6 hr. 33 min.	6 hr. 08 min.	6 hr. 58 min.	7 hr. 11 min.	10 hr. 25 min.
Tensile strength (1:3 mortar, lb./sq. in.)							
Age at test—							
3 days	270	299	324	353	310	188	151
7 days	296	317	329	388	398	320	334
28 days	354	462	427	467	566	502	531

CEMENT No. 2

	Original sample	Periods of storage: 5 days	10 days	15 days	20 days
Initial set	2 hr. 25 min.	2 hr. 28 min.	2 hr. 47 min.	2 hr. 24 min.	2 hr. 25 min.
Final set	3 hr. 25 min.	3 hr. 34 min.	3 hr. 55 min.	3 hr. 28 min.	3 hr. 30 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
3 days	315	364	421	424	441
7 days	367	420	438	445	478
28 days	474	521	509	519	549

CEMENT No. 3

	Original sample	Periods of storage: 7 days	14 days	21 days	28 days
Initial set	2 hr. 05 min.	3 hr. 40 min.	3 hr. 04 min.	3 hr. 47 min.	5 hr. 34 min.
Final set	3 hr. 08 min.	4 hr. 22 min.	5 hr. 37 min.	5 hr. 10 min.	7 hr. 34 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
24 hr.	354	390	393	390	347
2 days	368	387	435	388	468
3 days	437	420	434	465	482
7 days	440	494	566	553	529
28 days	492	516	538	558	554

CEMENT No. 4

	Original sample	Periods of storage: 7 days	14 days	21 days	28 days
Initial set	1 hr. 41 min.	1 hr. 31 min.	2 hr. 35 min.	3 hr. 15 min.	4 hr. 50 min.
Final set	2 hr. 35 min.	3 hr. 43 min.	4 hr. 45 min.	4 hr. 30 min.	7 hr. 00 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
24 hr.	410	420	387	381	337
2 days	420	406	440	417	400
3 days	472	485	470	492	450
7 days	495	563	531	546	561
28 days	568	625	548	555	580

CEMENT No. 5

	Original sample	Periods of storage 7 days	14 days	21 days
Initial set	1 hr. 33 min.	1 hr. 32 min.	3 hr. 23 min.	6 hr. 22 min.
Final set	4 hr. 53 min.	6 hr. 20 min.	6 hr. 18 min.	8 hr. 42 min.
Tensile strength (1:3 mortar, lb./sq. in.)				
Age at test—				
24 hr.	441	404	430	320
2 days	465	465	394	433
3 days	514	478	519	502
7 days	551	559	630	623
28 days	595	598	602	576

CEMENT No. 6

	Original sample	Periods of storage 7 days	14 days	21 days
Initial set	2 hr. 32 min.	2 hr. 31 min.	2 hr. 16 min.	2 hr. 20 min.
Final set	4 hr. 12 min.	4 hr. 31 min.	4 hr. 50 min.	5 hr. 43 min.
Tensile strength (1:3 mortar, lb./sq. in.)				
Age at test—				
24 hr.	374	448	397	447
2 days	388	401	423	418
3 days	450	421	455	472
7 days	511	511	569	555
28 days	513	568	636	576

EXPERIMENT II

Cement was stored in hemp bags in the laboratory room.

CEMENT No. 7

	Orig. sample	Periods of storage 1 month	2 months	3 months	6 months
Initial set	3 hr. 30 min.	3 hr. 00 min.	2 hr. 41 min.	3 hr. 49 min.	4 hr. 23 min.
Final set	4 hr. 56 min.	4 hr. 03 min.	3 hr. 52 min.	5 hr. 20 min.	6 hr. 34 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
7 days	360	424	431	509	481
28 days	434	578	578	562	571

CEMENT No. 8

	Orig. sample	Periods of storage 1 month	2 months	3 months	6 months
Initial set	2 hr. 20 min.	2 hr. 28 min.	2 hr. 28 min.	2 hr. 45 min.	4 hr. 34 min.
Final set	3 hr. 22 min.	3 hr. 30 min.	3 hr. 41 min.	4 hr. 05 min.	6 hr. 38 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
7 days	420	507	470	485	485
28 days	471	526	506	549	528

CEMENT No. 9

	Orig. sample	Periods of storage 1 month	2 months	3 months	6 months
Initial set	2 hr. 15 min.	3 hr. 10 min.	5 hr. 02 min.	6 hr. 18 min.	3 hr. 17 min.
Final set	3 hr. 05 min.	4 hr. 15 min.	6 hr. 15 min.	7 hr. 18 min.	5 hr. 17 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
7 days	431	505	519	499	485
28 days	526	548	571	507	544

CEMENT No. 10

	Orig. sample	Periods of storage 1 month	2 months	3 months	6 months
Initial set	1 hr. 52 min.	10 min.	10 min.	23 min.	30 min.
Final set	2 hr. 49 min.	15 min.	20 min.	33 min.	34 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
7 days	620	626	659	620	542
28 days	630	647	683	602	636

CEMENT No. 11

	Orig. sample	Periods of storage 1 month	2 months	3 months	6 months
Initial set	3 hr. 25 min.	3 hr. 05 min.	4 hr. 30 min.	4 hr. 32 min.	4 hr. 04 min.
Final set	5 hr. 00 min.	4 hr. 20 min.	5 hr. 45 min.	5 hr. 55 min.	5 hr. 39 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
7 days	455	424	462	438	452
28 days	535	559	563	492	506

CEMENT No. 12

	Orig. sample	Periods of storage 1 month	2 months	3 months	6 months
Initial set	1 hr. 55 min.	3 hr. 10 min.	4 hr. 45 min.	6 hr. 20 min.	6 hr. 24 min.
Final set	2 hr. 50 min.	4 hr. 15 min.	5 hr. 55 min.	7 hr. 25 min.	7 hr. 33 min.
Tensile strength (1:3 mortar, lb./sq. in.)					
Age at test—					
7 days	490	492	464	460	485
28 days	580	580	534	514	523

The chemical composition of the cement samples are given in the accompanying tables:

Setting times of the cement are found to be retarded in the majority of cases through storage, except cement No. 10, which became quick-setting up to storage period of one month.

Cements No. 1 to 11 show more or less increased strengths up to certain periods of storage. Cement No. 12 remains unchanged in strength up to 1 month; shows decreased strengths thereafter.

Cements No. 1 to 11 are comparatively high in lime content, while cement No. 12 is low in lime.

The cement which Alton J. Blank chose as a sample in his tests is also as low in lime content as cement No. 12. This fact may throw some suggestion on the solution of this problem.

A Study of Separates from Ground Phosphate Rock

A STUDY of mechanical separates from ground phosphate rock, made by W. L. Hill, H. L. Marshall and K. D. Jacobs of the U. S. Bureau of Soils, Department of Agriculture, is reported in *Industrial and Engineering Chemistry*. Samples of Florida pebble and hard rock, Tennessee brown rock and Wyoming and Idaho phosphates were investigated. All the samples were first ground to 100-mesh in a rotary disk mill in such a way as to simulate commercial grinding. Then each sample was separated into three fractions, "sand" greater than 50 microns; "silt," from 5 to 50 microns, and "clay" of less than 5 microns. These terms are those used in soil analysis by the Department of Agriculture. The coarser material was separated by dry sieving and the finer by siphoning of the "clay" fraction after the "silt" had been allowed to settle.

A chemical analysis of the separates showed that the most silica was found with the "sand" in the Eastern phosphates, but the reverse was the case with the Western phosphates. The phosphorous pentoxide content of the "silt" was slightly higher than that of either the "sand" and "clay" with the Eastern phosphates. With the Western phosphates the highest phosphorus content (1% to 2%) was in the "sands."

Tests for ammonium citrate and citric acid solubility showed a small but steady increase in solubility as the size of the particles decreased. The percentage of phosphorous pentoxide soluble in ammonium citrate (official method) ran from 0.2% to 9.2%, with an average of 3%. The table shows that the Western phosphate rocks were somewhat less soluble. In a 2% citric acid solution the solubilities ran from 12.4% to 27.4%, with an average of 16%. The table shows that the Florida phosphates were somewhat more soluble in citric acid than the others.

Hints and Helps for Superintendents

Special Rail Grizzly

RAIL GRIZZLIES are common in the mineral aggregate producing plants as they are cheaply installed and in most instances can be made from old scrap rails that are unsuited for other uses. It is natural then to expect that standard types of rails should be found in use and such is the case. However, at the new plant of Weston and Brooker Co., Camak, Ga., a rail grizzly was made of new 8-in. web rails.

Web rails for grizzly

Except at the ends, which act as bearing or supports for the rails, the webs and flanges have been cut away to about 2 in. below the head. By installing the rails so that they leave a 3-in. opening a non-blinding grizzly was attained.

The grizzly is mounted ahead of the secondary crusher.

Industrial cars carry material from new pit to plant

Novel Scheme to Save Money on a Long Pit-to-Plant Haul

By Willis Parker

A NOVEL and ingenious method of saving unnecessary transportation of useless material on a long pit-to-plant haul was worked out at the Service Gravel Co.'s plant, Riverside, Calif., by F. A. Braman, manager.

All of the ground within cableway excavator distance of the plant has been worked over. Rather than move the plant to another location, an industrial railroad track has been laid to another pit from which material is brought on two small dump cars, with a total capacity of about 10 cu. yd., 1600 ft. to the plant, dumped into a pit beside the track; and then elevated by belt conveyors for a total distance of 175 ft., where it passes through the crushers and then is elevated to the screens and washers above the bunkers, by bucket conveyor.

The ingenious arrangement is set up at the pit. Over the tracks is a 15-yd. hopper from which the material flows into the dump cars. It is filled from another and smaller hopper some 30 ft. ahead of it, which is supplied by the gasoline-motored shovel. The material is conveyed by belt conveyor from the smaller hopper to the top of the larger, where it passes through screens and some of the fine stuff discharged in piles alongside the track. Here is where the saving is made.

The amount of fine stuff going into the car-loading hopper can be regulated by the pit workers. If the demand is for a predominance of heavy material, all of the fine stuff may be eliminated. As one of the pit workers declared: "We can give them all rock, or all sand, or rock and sand in the proportions the plant desires. This prevents clog-

Shovel feeds small hopper which discharges to belt conveyor

Large hopper loads industrial cars at pit

ging up the plant and its vicinity with unneeded material, which except for this system would have to be moved away. When we operated a cableway excavator, we had to accept everything that the bucket brought in and work out methods of disposing of the silt."

The small gasoline engine and its two cars are sufficient to keep the plant supplied, since the capacity of the plant is only 700 tons daily. The "train" can make the round trip in seven minutes. The discarded material is piled where the shovel has excavated.

A Stitch in Time May Save the Crusher

DUMPING 12 cu. yd. of quarry run stone from a side-dump car to a primary crusher is a severe test of the ruggedness and strength of the crushing unit, and any way of reducing the fall or of reducing the power of the blow struck by such falling stone is good business. Elmer French, former superintendent of the Hull plant of the Canada Cement Co., who probably has, in his lifetime, superintended the crushing of as much stone as any man in the Dominion, reduced the chances of injury to the primary crusher by simply wrapping a stout piece of timber with old cables and laying this armor-coated log across the top of the crusher in such a fashion that when the stone is dumped from the car, the rock impinges against the log, reducing the fall sufficiently to eliminate this hazard.

Armored log breaks force of falling rock

Lubricating Exposed Gears

By W. E. Warner
Welwyn Garden City, Herts, England

WHERE GEARING and other slow-moving parts of machinery are in exposed locations an adhering grease or heavy oil is usually used for their lubrication. Under such conditions corrosion must be prevented in addition to the obtaining of proper lubrication.

The addition of from 3 to 5% of zinc oxide to the lubricant is beneficial in this respect, as a zinc film is formed on the metal surfaces of the gears and this prevents any possibility of corrosion.

The zinc oxide will not cause clogging unless too much is added to the lubricant. Lubricants containing zinc oxides have successfully provided lubrication and combated corrosion when other lubricants have failed.

Screen Protector

AT THE new loading plant of the Stewart Sand and Material Co., Pixley, Mo., near Kansas City, the stone just prior to loading is passed over a final vibrating screen that acts as a cleaner. This screen is fed by a belt conveyor and as the stone falls to the screen cloth a piece of old conveyor belt has been fastened to the discharge end of the conveyor in such a fashion that the impact of the falling stone is absorbed by the belting, thus giving added life to the screen cloth.

The illustration shows how this was carried out. While an extremely simple expedient and as effective as it is simple, few users of vibrating screen take such precautions to get added life from their screen cloths.

Uses old conveyor belt

Rock Products Clinic

One Reader Agrees with Our Platform

THE EDITOR: We have read many articles on the present depression, and the best one to come under our observation was your editorial appearing on the front cover of ROCK PRODUCTS, May 7, 1932.

Congratulations and more power to you. We are in hearty accord with your ideas.

F. D. HORTON, President,
Standard Building Material Co.,
Birmingham, Ala.

Loss of Sand in Transit?

THE EDITOR: This inquiry is made to ascertain if you can furnish data which will show from actual check the percentage of loss that may be sustained in handling sand and gravel with gasoline trucks from railroad car at siding to points several miles distant where said sand and gravel is used in making concrete for highway paving.

The following example may explain this situation more fully:

Proposal was asked for sand and gravel for the construction of a highway with one course concrete, embracing 6436 tons of sand and 12,000 tons of gravel. In square yards, this was reduced to 62,775 sq. yd. of paving. Gravel contractor's bid amounted to a total of $34,490.68 for furnishing the material f.o.b. cars at contractor's switch. The general contractor filed a bid offering to furnish sand and gravel in place for the total sum of 62c. per sq. yd. of concrete pavement, the total of which amounted to $38,920.50.

If this bid is accepted, owner will pay a premium of $4,429.82, but in doing so, he will eliminate all loss from waste and expense of checking gravel from cars and probably several other minor expenses. This amounts to about 12.8%, and it is desired to know just where the economical limit may be placed to compensate the owner for losses sustained in transportation of sand and gravel from railroad cars to destination.

If you have such data in your files, it will be highly appreciated.

"Southern Highway Commissioner."

* * * * *

A copy of this letter was submitted to a large Mid-West sand producer, who replied as follows:

"With reference to the question raised by the commissioner: We have never discovered any loss in trucking sand that would be measurable between the point of weighiing at the loading point and weighing when unloaded. Where we handle sand through our yards we have been putting the sand in from weighed railroad cars with a 5% allowance against the sand taken out of the yard in weighed trucks. This does not always check out as some of our yards make no loss whatever.

"The principal loss has seemed to be in those yards where the sand is unloaded by a locomotive crane and I have assumed that the loss is made up of the sand which goes back to the railroad in the bottom of the cars. We do not find much loss if the railroad cars are weighed after five or six hours except in a case of an unusual tight steel where some water may be retained. Most of our cars are weighed a sufficient time after loading so that the moisture loss is not very much and this does not account for the loss in our yards.

"Of course all sorts of results might be obtained should the sand be measured at any point by yard rather than by ton.

"The amount of sand or gravel going into a yard of concrete is not as simple a proposition as a good many people believe, and I doubt if the quantity can be satisfactorily determined where the mixing is done by volume, and unless the concrete mixing plant has a weighing batcher I doubt if there is any satisfactory way to check back against the sand and gravel used in a job."

Sand Separation Problem

EDITOR SHAW recently received a wire from a Southern sand and gravel producer as follows:

"Reading your book on sand settling. Having much trouble with sand. Fine and coarse will not separate. High velocity. Feed carrying extra large percentage of 65- to 100-mesh sand to get rid of. Ten-inch pump. Box 5 ft. wide, 15 ft. long and 9 ft. deep. Would you recommend change in dimensions?"

To which Mr. Shaw replied in effect that he would either double the present settling box or put in a dewatering box which would get rid of half the water and most of the fine sand and send the remainder of the feed to the present settling box. He also wrote him a letter which explains this more fully than was possible in a telegram. The letter follows:

"I answered your telegram by suggesting that you double your present settling box. This was on the assumption that the words 'high velocity' in your wire referred to the rate of flow through the box. Your 10-in. pump probably throws 7 ft. to 9 ft. per sec., which would make the flow through the box at the rate of 3 ft. per sec., approximately. It would take a very long box with that velocity to throw out the 65-100-mesh sand without throwing out a lot of the coarse. About half that velocity would be right with a 15-ft. length. If you find that there is too much fine with the coarse with the two boxes, it is easy to put in a partition to cut them off so as to give you just what you want.

"If there is 50% or so of the fine sand that you want to remove it will be difficult to get rid of it in one operation. The larger grains will drag down a lot of it in settling. In such cases I recommend the use of a dewatering box with an overflow area such that about half of the water and most of the fine sand will be thrown out. The remainder of the water and the heavy sand will then go to a settling box for final classification.

"This will not work well if the feed (the pump discharge) has more than 15% solids, because the part going to the settling box will be pretty thick to give good classification. On the assumption that the solids are less than 15%, I am enclosing a sketch of a dewatering box 6 ft. long, 4 ft. wide and 6 ft. deep. It has a sloping bottom leading to an opening with a sliding gate that can be set to regulate the amount of water and solids going to the settling box. If you have a screen to take out gravel it can be put either before or after this settling box.

"I prefer this arrangement to doubling the boxes, because it gives two classifications. I have found it very satisfactory in practice. I put such a combination of dewatering box and settling box on a dredge last year and the results were all that we expected.

"You do not mention any difficulties with washing out clay or trash, so I do not suppose you have any. If you do, any combination of boxes may not be enough to make a clean product, unless you use some fresh water with them.

"One way to do this is to make as thick a pulp as you can with the dewatering box, getting rid of as much clay and fine sand as possible in the overflow. This thick pulp is then run into the settling box with enough fresh water to carry off the remainder of the clay and fine sand. To tell you how much and the size of boxes required it would be necessary for me to know a number of details not disclosed in the question as submitted in the original inquiry.

"The other way would be to run the feed either directly or after partial dewatering to some form of classifier which has a rising current of fresh water. The Shaw classifier is much used for this purpose and you will find other rising current types described in my booklet, "Sand Settling." If the expense were not prohibitive I would always use some form of rising current classifier, because it not only makes a cleaner product but it gives a control of the classification that I have not been able to get with any other device.

"And if you are going to add fresh water after dewatering, the sand drag or some other form of mechanical classifier would give a better and cleaner product than any simple settling device. It would also give a cleaner product than the settling box under normal conditions, because it gets rid of more of the water carrying clay and fine sand."

Editorial Comment

The Tide Is Turning!

Developments of the last two weeks have materially changed the outlook of the construction industry. From both the legislative and executive branches of the federal government has come evidence of recognition for the need of stimulation of the construction industry by a bond issue for public works. Having as nearly "balanced the budget" as possible, there is every reason to believe the Congress will pass some kind of a measure to aid public works financing before it adjourns or recesses in June.

Naturally this should result in an early change for the better in the construction materials industries. To us the proposition seems entirely sound and logical—we have continuously favored such a bond issue. We are glad to know that some truths long overlooked are beginning to receive attention. Some of these truths are: Dollars in industry and commerce and government today are worth at least twice as much as in 1929; at the height of the next boom, seven to ten years from now, dollars will undoubtedly be worth about half what they are now; now, therefore, is the worst possible time to liquidate debts since twice to three or more times the value of 1929 securities or commodities or other form of wealth must be liquidated to meet these debts; it is a wonderful time to borrow money for capital expenditures, if a borrower can obtain the necessary credit, because dollars borrowed and invested today can be paid back in future dollars worth half as much; current discussions of budget balancing make no distinction between current expenditures and capital expenditures; there is not one iota of evidence that the credit of the United States is in the least danger.

The fiscal system of the United States, which charges all capital investments in public roads, post offices, river and harbor improvements, and public works of all kinds to current expenditures of the year in which they are made, is undoubtedly a splendid system to adhere to in the long run. But in times like these it is absurd to require the budget to be balanced to include such items of capital expenditure. It is contrary to all the logic used with such telling effect in the last presidential election, which was to have abolished poverty from this country.

In spite of the hullabaloo of the Chamber of Commerce of the United States and other propaganda agencies, not all of its members have lost their sanity. The following letter from a hard-headed, conservative New England Yankee, W. B. Hopkins, president of the Circular Tool Co., Inc., Providence, R. I., printed in small type in the back of the current issue of the *Nation's Business,* contains more sense, in our estimation, than the bold-face type splurges which fill the fore part of the book. It carries out our own thoughts so much better than we can express them that we reproduce the letter entire and we do not reduce the size of the type as did our esteemed contemporary:

"The writer has noted with some amusement the 'tempest in a teapot' made by many writers and agitators over what they think (or don't think) is the alarming increase in taxation, as for instance, the many editorials which were compiled by the U. S. Chamber of Commerce and issued under the title of 'The Cost of Government' and an article in the March *Nation's Business* in reference to lowering government expense, and other numerous articles and speeches, none of which gives the real relative facts of the case.

"In the first place, no adjustment is made for the great decrease in the purchasing power or value of the dollar or the great increase in national earnings to 1930 (which represents in direct proportion the ability to pay taxes) or to the increase in population.

"By scaling down the government cost graph to an amount derived by these adjustments and deducting expenses incident to the War, you will find that the increase in taxation is relatively very small and the extra benefits derived from such increases are certainly worth all they cost, and due to our increased earning power, no more than to which we are entitled.

"Of course in time of depression like the present, the ratio of taxes to earnings will increase greatly, due to previous commitments and the necessity of operating the Government on a stable basis, but this fluctuation should be taken care of by a reserve as is done by any well conducted business.

"If all this agitation results in a definite lowering of government income, what about the employees that will be thrown out of jobs directly or indirectly by the same people who pay the taxes?

"The fact is that, with no income, any expense is a great burden, and the solution of the problem is to get the wheels of industry turning, and thereby get an income instead of going into hysterics over expenses which will take care of themselves when this is done.

"But it should be understood that the matter of stable prosperity strictly depends upon a radical reduction in the spread between the cost of an article and its selling price to the consumer, and a much more general distribution of the profit derived from our increased capacity to produce, as it is impossible for the few to consume the excess production of the many."

* * * * * *

So, as soon as our present hysteria is over, we look forward confidently to a period of increasing prosperity; more sanely managed than those of the past, but nevertheless, it is our guess and our belief, surpassing all previous booms in volume of business transacted. For much profit hitherto spent for unnecessary productive facilities will be spent to decrease costs of production and to increase the buying power of the ordinary man.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[27]	5-18-32	91	98	
Alpha P. C. com.[2]	5-16-32	6	7½	25c qu. Apr. 25
Alpha P. C. pfd.[2]	5-16-32	.....	85	1.75 qu. Mar. 15
Amalgamated Phosphate Co. 6's, 1936[19]	5-14-32	.....	88	
American Aggregates com.[19]	5-14-32	1½	3	
American Aggregates pfd.[19]	5-14-32	5	10	1.75 qu. Jan. 1
Amer. Aggr. 6's, w.w.[19]	5-14-32	20	30	
Amer. Aggr. 6's, ex.w.[19]	5-14-32	18	28	
Amer. L. & S. 1st 7's[27]	5-18-32	70	80	
American Silica Corp. 6½'s[39]	5-17-32	No market		
Arundel Corp. new com.	5-17-32	20 actual sale		75c qu. Apr. 1
Bessemer L. & C. Class A	5-17-32	.....	4	
Bessemer L. & C. 1st 6½'s[4]	5-14-32	15	18	
Bloomington Limestone 6's[27]	5-18-32	25	.....	
Boston S. & G. new com.[37]	5-13-32	3	6	15c qu. Apr. 1
Boston S. & G. new 7% pfd.[37]	5-13-32	25	35	87½c qu. Apr. 1
California Art Tile, A	5-11-32	1½	4¼	
California Art Tile, B[9]	5-13-32	.....	5	
Calaveras Cement com.	5-11-32	⅛	2	
Calaveras Cement 7% pfd.	5-11-32	.....	78	1.75 qu. Apr. 15
Canada Cement com.	5-16-32	3¼	4	
Canada Cement pfd.	5-16-32	32	35	1.62½ qu. Mar. 31
Canada Cement 5½'s[42]	5-14-32	65	70	
Canada Crushed Stone bonds[42]	5-14-32	60	70	
Canada Crushed Stone com.[42]	5-14-32	3	.....	
Certainteed Products com.	5-17-32	1¾	2	
Certainteed Products pfd.	5-17-32	6	9½	1.75 qu. Jan. 1
Cleveland Quarries	5-16-32	.....	54	10c qu. June 1
Consol. Cement 1st 6½'s, A[44]	5-17-32	3	7	
Consol. Cement notes, 1941[27]	5-18-32	No market		
Consol. Cement pfd.[27]	5-18-32	48	.....	
Consolidated Oka Sand and Gravel (Canada) 6½'s[32]	5-13-32	80	85	
Consolidated Oka Sand and Gravel (Canada) pfd.[42]	5-14-32	.....	35	1.75 qu. Oct.10,'31
Consol. Rock Prod. com.[35]	5-12-32	10c	20c	
Consol. Rock Prod. pfd.[35]	5-12-32	50c	1	
Consol. Rock Prod. units[35]	5-12-32	1¼	2	
Consol. S. & G. pfd. (Can.)	5-16-32	.....	50	1.00 qu. May 16
Construction Mat. com.	5-17-32	.....	⅞	
Construction Mat. pfd.	5-17-32	2	4½	
Consumers Rock and Gravel, 1st Mtg. 6's. 1948[35]	5-12-32	38	42	
Coosa P. C. 1st 6's[23]	5-13-32	.....	30	
Coplay Cem. Mfg. 1st 6's[19]	5-14-32	45	55	
Dewey P. C. com.[47]	5-17-32	80	90	
Dolese and Shepard	5-17-32	14	16	$1 qu. Jan. 1
Dufferin Pav. & Cr. Stone pfd.	5-16-32	.....	30	1.75 qu. Apr. 1
Dufferin Pav. & Cr. Stone com.	5-16-32	.....	5	
Edison P. C. com.[19]	5-14-32	.....	16	
Edison P. C. pfd.[19]	5-14-32	.....	25	
Federal P. C. 6½'s, 1941[27]	5-18-32	60	.....	
Giant P. C. com.[2]	5-16-32	2	4	
Giant P. C. pfd.[2]	5-16-32	7	10	1.75 s.-a. Dec. 15
Gyp. Lime & Alabastine, Ltd.	5-16-32	2⅝	3	10c qu. Oct.5,'31
Gyp. Lime & Alabastine 5½'s[43]	5-14-32	48	55	
Hermitage Cement com.[11]	5-14-32	5	10	
Hermitage Cement pfd.[11]	5-14-32	25	30	
Ideal Cement 5's, 1943[20]	5-14-32	80	90	
Ideal Cement com.	5-17-32	15	17	50c qu. Apr. 1
Indiana Limestone units[27]	5-18-32	No market		
Indiana Limestone 6's	5-13-32	7½	8	
International Cem. com.	5-17-32	7½	8	50c qu. Mar. 31
International Cem. bonds, 5's	5-17-32	45⅜ actual sale		Semi-ann. int.
Iron City Sand & Gravel 6's[36]	4-29-32	.....	70	
Kelley Is. L. & T. new stock	5-16-32	8	10	25c qu. Apr. 1
Ky. Cons. Stone com.	5-16-32	.....	2	
Ky. Cons. Stone pfd.	5-16-32	.....	50	
Ky. Cons. St. 1st Mtg. 6½'s[45]	5-12-32	15	20	
Ky. Cons. St. V. T. C.[45]	5-12-32	1	2	
Ky. Rock Asphalt com.	5-16-32	1¾	2½	
Ky. Rock Asphalt pfd.	5-16-32	20	25	1.75 qu. Dec.1,'31
Ky. Rock Asphalt 6½'s	5-16-32	.....	70	
Lawrence P. C.[2]	5-16-32	8	12	
Lawrence P. C. 5½'s, 1942[2]	5-16-32	28	32	
Lehigh P. C. com.	5-17-32	4	5	
Lehigh P. C. pfd.	5-17-32	49½	50	1.75 qu. Apr. 1
Louisville Cement[7]	5-12-32	60	80	
Lyman-Richey 1st 6's, 1932[13]	5-13-32	95	.....	
Lyman-Richey 1st 6's, 1935[13]	5-13-32	90	.....	
Marblehead Lime 6's[14]	5-13-32	No market		
Marbelite Corp. com.[35] (cement products)	5-12-32	3c	.....	
Marbelite Corp. pfd.[35]	5-12-32	50c	.....	
Marquette Cem. Mfg. 1st 5's, 1936[46]	5-17-32	80	.....	
Marquette Cem. Mfg. 1st 6's, 1936[46]	5-17-32	85	.....	
Material Service Corp.	5-17-32	10	11	
McCrady-Rodgers 7% pfd.[22]	5-12-32	30	34	87½c qu. Dec. 30, 1931
McCrady-Rodgers com.[22]	5-12-32	5	10	75c qu. Jan. 26
Medusa P. C. pfd.[47]	5-17-32	50	60	1.50 qu. Apr. 1
Medusa P. C. com.	5-16-32	5	8	
Monarch Cement com.[47]	5-17-32	60	65	
Michigan L. & C. com.[6]	5-13-32	45	.....	
Missouri P. C.	5-17-32	5	6	25c qu. Jan. 30
Monolith Portland Midwest com.[9]	5-13-32	¾	1	
Monolith P. C. com.[9]	5-13-32	1½	2	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	5-13-32	3½	4	40c s.a. Jan. 1
Monolith P. C. units[9]	5-13-32	8½	10	
Monolith P. C. 1st Mtg. 6's[9]	5-13-32	55	62	
National Cem. (Can.) 1st 7's[27]	5-18-32	80	90	
National Gypsum A com.[27]	5-18-32	½	2	
National Gypsum pfd.[27]	5-18-32	21	26	1.75 qu. Apr. 1
National Gypsum 6's[3]	5-17-32	50	60	
Newaygo P. C. 1st 6½'s[27]	5-18-32	72	.....	
New England Lime 6's, '35[19]	5-14-32	No market		
N. Y. Trap Rock 1st 6's	5-17-32	61½ actual sale		
N. Y. Trap Rock 7% pfd.[19]	5-14-32	10	.....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	5-13-32	14 actual sale		
North Amer. Cem. com.[27]	5-18-32	¾	1	
North Amer. Cem. 7% pfd.[27]	5-18-32	1	4	
North Shore Mat. 1st 5's[35]	5-17-32	35	.....	
Northwestern States P. C.[47]	5-17-32	23	26	
Ohio River S. & G. com.	5-16-32	.....	8	
Ohio River S. & G. 7% pfd.	5-16-32	.....	98	
Ohio River S. & G. 6's[16]	4-30-32	.....	70	
Oregon P. C. com.[9]	5-13-32	8	12	
Oregon P. C. pfd.[9]	5-13-32	80	85	
Pacific Coast Aggr. com.[40]	5-12-32	.....	25c	
Pacific Coast Aggr. pfd.[40]	5-12-32	.....	50c	
Pacific Coast Aggr. 6½'s, 1944[5]	5-12-32	16	20	
Pacific Coast Aggr. 7's, 1939[5]	5-12-32	3	5	
Pacific Coast Cement 6's[5]	5-12-32	65	.....	
Pacific P. C. com.	5-11-32	3	6	
Pacific P. C. pfd.	5-11-32	.....	50	1.62½ qu. Apr. 5
Pacific P. C. 6's	5-11-32	.....	94	
Peerless Cement com.[1]	5-16-32	10c	25c	
Peerless Cement pfd.[1]	5-16-32	4	6	
Penn.-Dixie Cement com.	5-17-32	½	¾	
Penn.-Dixie Cement pfd.	5-17-32	4	5⅛	
Penn.-Dixie Cement 6's	5-17-32	30¾ actual sale		
Penn. Glass Sand Corp. pfd.[19]	5-14-32	60	70	1.75 qu. Apr. 1
Penn. Glass Sand Corp. 6's[19]	5-14-32	.....	75	
Petoskey P. C.	5-17-32	1¼	2¼	
Port Stockton Cem. com.[9]	5-13-32	No market		
Riverside Cement com.[9]	5-13-32	.....	12	
Riverside Cement pfd.[9]	5-13-32	55	60	1.50 qu. Feb.1
Riverside Cement, A	5-11-32	.....	8	
Riverside Cement, B[9]	5-13-32	70c	1	
Roquemore Gravel 6½'s[17]	5-14-32	80	90	
Sandusky Cement 6½'s, 1932-37[19]	5-14-32	80	90	
Santa Cruz P. C. com.	5-11-32	.....	60	$1 qu. Apr. 1
Schumacher Wallboard com.	5-11-32	1	.....	
Schumacher Wallboard pfd.	5-11-32	.....	19½	50c qu. May 15
Signal Mt. P. C. pfd.[47]	5-17-32	5	10	
Southwestern P. C. units[35]	5-12-32	150	200	
Standard Paving & Mat. (Canada) com.	5-16-32	1½	2	
Standard Paving & Mat. pfd.	5-16-32	.....	35	1.00 qu. May 16
Superior P. C., A[9]	5-13-32	23	27	27½c mo. June 1
Superior P. C., B[9]	5-13-32	4	5¼	12½c Mar. 21
Trinity P. C., units[47]	5-17-32	22	25	
Trinity P. C. com.[47]	5-17-32	5	10	
Trinity P. C. pfd.[47]	5-17-32	20	23	
U. S. Gypsum com.	5-17-32	15½	16	40c qu. June 30
U. S. Gypsum pfd.	5-17-32	96	98	1.75 qu. June 30
Wabash P. C.[21]	5-14-32	8	10	
Warner Co. com.[16]	4-30-32	3	3¼	25c qu. Oct.15,'31
Warner Co. 1st 7% pfd.[16]	4-30-32	.....	50	1.75 qu. Apr. 1
Warner Co. 6's, 1944, with war.	5-13-32	.....	58⅞	
Whitehall Cem. Mfg. com.[19]	5-14-32	.....	16	
Whitehall Cem. Mfg. pfd.[19]	5-14-32	.....	50	
Wiscon. L. & C. 1st 6's, '33[15]	5-17-32	35	.....	
Wolverine P. C. com.	5-17-32	.....	3¼	15c qu. Nov.15,'31
Yosemite P. C. A. com.[9]	5-13-32	1	1½	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler, Beadling & Co., Youngstown, Ohio. [5]Smith, Camp & Riley, San Francisco, Calif. [6]Frederick H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central-Republic Bank & Trust Co., Chicago. [16]J. S. Wilson, Jr., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hewitt, Ladin & Co., New York. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simonds & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [23]Howard R. Taylor & Co., Baltimore. [24]Richards & Co., Philadelphia, Penn. [25]Hincks Bros. & Co., Bridgeport, Conn. [26]Bank of Republic, Chicago, Ill. [27]National City Co., Chicago, Ill. [28]Chicago Trust Co., Chicago, Ill. [29]Boettcher-Newton & Co., Denver. [30]Hanson and Hanson, New York. [31]S. F. Holzinger & Co., Milwaukee, Wis. [32]Tobey and Kirk, New York. [33]Steiner, Rouse and Co., New York. [34]Jones, Heward & Co., Montreal, Que. [35]Tenney, Williams & Co., Los Angeles, Calif. [36]Stein Bros. & Boyce, Baltimore, Md. [37]Wise, Hobbs & Arnold, Boston. [38]E. W. Hays & Co., Louisville, Ky. [39]Blythe Witter & Co., Chicago, Ill. [40]Martin Judge Co., San Francisco, Calif. [41]A. J. Pattison Jr. & Co. Ltd., Toronto, Canada. [42]Nesbitt, Thomson & Co., Toronto. [44]E. H. Rollins, Chicago. [45]Dunlap, Wakefield & Co., Louisville, Ky. [46]First Union Trust & Savings Bank, Chicago. [47]Anderson Plotz and Co., Chicago, Ill.

Calaveras Cement Co.

THE Calaveras Cement Co., San Francisco, Calif., for the year ended December 31, 1931, reports net profit of $25,786, after all charges, including depreciation and depletion and provision for federal income taxes.

This compares with net profit of $91,292, after all charges in the year ended December 31, 1930.

Net profit for the year ended December 31, 1931, is equivalent to $1.14 a share on 22,625 shares of 7% preferred stock, par $100, outstanding at the close of 1931, and compares with $4.03 a share on 22,615 preferred shares in 1930.

During the year just reported, the company continued its policy of liberal charges to depreciation, the amount set aside from earnings for this account being $109,510, or slightly in excess of the charge made in the previous year. In addition the company charged off $25,402, representing development and experimental expense in connection with a new grade of cement introduced during the year.

The income account of Calaveras Cement Co. for the year ended December 31, 1931, compares as follows:

	1931	1930
Gross profit	$328,632	$403,027
Other income	26,003	29,615
Total income	$354,634	$432,642
*Selling, administrative and general expenses	193,936	233,849
Operating income	$160,968	$198,793
Experimental work, etc.	25,402	.....
Depreciation and depletion	109,510	107,501
Net profit	$ 25,786	$ 91,292

*Including federal taxes.

The company's balance sheet at the close of the year showed cash and certificates of deposit of $684,092, which was only slightly lower than the cash position shown at the close of 1930. The ratio of current assets to current liabilities at December 31, was 13.2 to 1, compared with a ratio of 11.1 to 1 at the close of 1930.

The balance sheet of Calaveras Cement Co., as of December 31, 1931, compares as follows:

ASSETS

	1931	1930
Cash	$ 534,092	$ 542,834
Certificates of deposit	150,000	150,000
Accounts receivable, net	84,466	103,253
Notes receivable	32,206	29,776
Inventories	322,855	437,141
Total current assets	$1,123,619	$1,263,004
Investments	*122,757	58,050
Balance due on deferred property sales contract	159,500	159,500
†Land, buildings, machinery and equipment	1,537,577	1,599,766
Deferred charges	7,913	12,037
Total assets	$2,951,366	$3,092,357

LIABILITIES

Accounts payable	$ 48,614	$ 66,376
Dividends payable	36,498	39,576
7% preferred stock	2,262,500	2,261,500
Common stock	52,750	52,730
Surplus	551,004	672,175
Total liabilities	$2,951,366	$3,092,357

*Including 1769 shares of 7% preferred stock and 498 shares of common stock of Calaveras Cement Co., held by subsidiary.

†After reserve for depreciation of $592,804 at December 31, 1931, and $483,294 at the close of 1930.

International Cement Corp. First Quarter Earnings

THE International Cement Corp., New York City, reports for the first quarter of 1932:

	First quarter, 1932
Gross sales	$3,219,764.79
Less: Packages, discounts and allowances	633,747.49
Net sales	$2,586,017.30
Manufacturing cost, excluding depreciation	$1,350,683.38
Depreciation	466,970.69
	$1,817,654.07
Manufacturing profit	$ 768,363.23
Shipping, selling and administrative expenses	849,577.56
	$ 81,214.33
Interest charges and financial expenses	199,735.88
	$ 280,950.21
Reserves for contingencies, etc.	128,763.20
Net loss	$ 409,713.41

After interest on gold debentures, reserves for taxes and all other charges, including depreciation of $466,970.69, for which there were no cash expenditures, the results for the first quarter show a net loss of $409,713.41.

Depressed general business conditions resulting in light shipments coupled with abnormally low sales prices are the controlling influences affecting the results for the quarter.

For the first quarter of 1931 sales were $4,878,748 and there was a net profit of $410,909.

Alpha Cement Earnings Year Ended March 31

THE Alpha Portand Cement Co., Easton, Penn., reports for the year ending March 31:

CONSOLIDATED EARNINGS, 12 MONTHS, TO MARCH 31

	1932	1931
Net sales	$5,631,354	$9,580,011
Operating expenses	5,410,263	7,025,224
Depreciation	1,382,317	1,345,253
Operating income	(d)1,161,226	1,209,534
Other income (net)	246,066	159,278
Total income	(d)915,160	1,368,812
Federal taxes	.....	170,000
Minority interest	7,387	.....
Net income	(d)907,773	1,198,812
Preferred dividends	140,000	140,000
Common dividends	711,000	1,244,250
Deficit	$1,758,773	$ 185,438
Earned per share, common	nil	$1.49

Number of common shares, 711,000.

Consolidated Surplus Account, 12 months ended March 31, 1932: Surplus, April 1, 1931, $3,240,274. Deduct: Deficit of subsidiary not heretofore consolidated, applicable to minority interest and adjustment of acquired surplus, $51,668; deficit (after dividends) for 12 months ended March 31, 1932, $1,758,773; balance, $1,429,833. Add: Reduction of stated value of common capital stock, $5,648,500; unused portion of provision for additional federal taxes prior years, $12,158; total, $7,090,491. Deduct: Write-down of U. S. Government and municipal securities to market value as of December 31, 1931, $426,338. Surplus on March 31, 1932, $6,664,153.

WORKING CAPITAL, MARCH 31

	1932	1931
Current assets	*$8,114,573	$9,672,687
Current liabilities	450,967	629,988
Working capital	$7,663,606	$9,042,699

*Includes cash and marketable securities of $5,362,482.

Florida Portland Cement

THE Florida Portland Cement Co., Tampa, Fla., reports for the years ending December 31 a balance sheet as follows:

Assets:	1931	1930
Property and equipment	$5,116,564	$5,101,683
Organization expenses	691,884	691,884
Current assets:		
Inventories	241,345	328,693
Cash	421,512	221,427
Sundry receivables, etc.	198,234	262,520
Investments	24,558	7,182
Deferred charges	67,395	67,287
Total	$6,761,491	$6,680,676
Liabilities:		
Preferred stock	$4,997,100	$4,997,100
*Common stock	1,100	1,100
Bonded debt	1,488,000	1,565,000
Current liabilities:		
Accounts payable, etc.	33,415	48,625
Depreciation and depletion reserve	554,053	454,317
Deficit	312,175	385,466
Total	$6,761,491	$6,680,676
Current assets	$861,091	$812,640
Current liabilities	33,415	48,625
Working capital	$827,676	$764,015

*Represented by 75,000 no par shares.

Republic Portland Cement

THE Republic Portland Cement Co., San Antonio, Tex., reports for the years ending December 31:

INCOME ACCOUNT

	Year to Dec. 31, 1931	Sept. 1, 1929, to Dec. 31, 1930
Sales	$1,209,143	$2,712,722
Cost of sales	466,819	1,001,900
Operating expenses, depreciation and depletion	437,773	902,020
Selling, general and other expenses	213,016	405,182
Net earnings	91,534	403,620
Other income	9,663	132,859
Total income	101,197	536,479
Interest on bonds	69,397	97,877
Federal taxes, etc.	4,301	41,155
Net income	27,499	397,447
Preferred dividends	76,206	112,629
Surplus	(d)$48,707	$284,818
Earned per share, common	nil	$1.14

Number of common shares, 249,620.

BALANCE SHEET, AS OF DECEMBER 31

Assets:	1931	1930
*Land, plant and machinery	$3,347,944	$3,406,460
Current assets:		
Cash	166,609	52,128
Accounts receivable	25,960	178,256
Inventories	167,954	222,811
Other assets	23,814	71,205
Deferred charges	12,267	3,908
Total	$3,744,549	$3,934,768
Liabilities:		
Preferred stock	$1,090,000	$1,130,000
†Common stock	1,248,100	1,248,100
Bonded debt	1,141,000	1,181,000
Current liabilities:		
Accounts payable	14,347	39,595
Accrued taxes, etc.	18,084	51,255
Earned surplus	233,018	284,818
Total	$3,744,549	$3,934,768
Current assets	$360,523	$453,195
Current liabilities	32,430	90,850
Working capital	$328,093	$362,345

*After depletion and depreciation: 1931, $211,082; 1930, $144,694. †Represented by 249,620 no par shares.

Vulcanite Cement

THE Vulcanite Portland Cement Co., Philadelphia, Penn., reports for the years ended December 31:

A net loss, after expenses, depreciation, depletion, interest, etc.:

	1931	1930
Years to December 31	$234,529	$104,525

Pacific Coast Aggregates Makes Readjustment

THE protective committees for the 6½% bonds and 7% debentures of the Pacific Coast Aggregates, Inc., San Francisco, Calif., have declared in effect the agreements of readjustment with respect to interest and sinking fund on such securities, according to a letter being mailed to bond and debenture holders.

The company has deposited with the trustees sufficient funds to pay one-half of the interest which was due on the 6½% first mortgage bonds on January 1, 1932. Depositing bondholders may collect their share of this interest, according to the letter being mailed them, by forwarding their certificates of deposit to the depositary which issued them together with the usual form 1000 U. S. internal revenue ownership certificate. The certificates of deposit will be endorsed and returned to the depositing bondholders, together with a check in the amount of the interest being paid.

The committees have extended the time for deposit under the agreements of readjustment and bond and debenture holders who have not already deposited may still do so. The depositaries are Bank of America, N. T. & S. A. and Anglo-California Trust Co. in San Francisco, and California Trust Co. in Los Angeles.

The agreements of readjustment provide that for the next three years interest and sinking fund will be paid upon the company's bonds and debentures only if earned, but that unpaid interest and sinking fund will accumulate and fall due at the end of the three-year period, at which time the terms of the present trust indentures securing both bonds and debentures will be again in full effect.

New England Lime Co.

THE annual report of the New England Lime Co., Pittsfield, Mass., for the fiscal years ended November 30 contains the following:

The net sales for 1931 were less than the net sales for 1930 by $179,004.49, or approximately 21.70%; nevertheless the income available for interest in 1931 was $20,155.65, whereas the same item for 1930 showed a deficit of $29,379.72. There was, therefore, an improvement of $49,535.37 in 1931 over 1930 notwithstanding the decrease in sales. Net sales of lime products of this company have declined tremendously. In 1926 the net sales amounted to $1,798,010.42; in 1930 net sales were $824,700.39, and in 1931 they were $645,695.90, or about 40% of what they were in 1926. The entire lime product industry shows similar or worse diminution in sales, due to the decline in building and the general trade depression.

After careful study the management has put into effect a program for further savings in insurance costs, purchase price of fuel and eliminations and reductions in wages and salaries, etc., amounting to a total of approximately $2500 per month. With these additional economies in effect the company is better prepared to meet conditions in 1932, but its showing will depend entirely upon economic conditions during the year and the volume of business obtained.

There also appears herewith a balance sheet of the company as of November 30, 1931. This shows total current assets (including inventories) of $226,309.41 and total current liabilities (exclusive of sinking fund requirements and accrued bond interest) of $20,599.89. The cash position, therefore, is excellent and it is the policy of the company to preserve this position because of the seasonal variation in business, which falls off materially in December, January, February and March.

BALANCE SHEET OF THE NEW ENGLAND LIME CO.
(November 30, 1931)

ASSETS

Current assets		
Cash and cash resources		$ 75,928.21
Notes and accounts receivable—net		54,265.84
Inventories		96,115.36
Total current assets		$ 226,309.41
Funds held by trustee (representing proceeds of sale of mortgaged property)		6,000.00
Deferred and prepaid items		56,781.91
Fixed assets		
Stated at appraised values (determined by the American Appraisal Co. as of May 1, 1925), plus net additions since at cost.		
Land, buildings, machinery, equipment, limestone deposits, etc., at depreciated values		3,269,575.69
Total assets		$3,558,666.41

LIABILITIES

Current liabilities		
Accounts payable		$ 12,891.80
Accrued taxes, wages, insurance, etc.		7,708.09
Total current liabilities (Exclusive of sinking fund requirements and accrued bond interest)		$ 20,599.89
Accrued interest on bonds		100,342.50
First mortgage 10-year 6% sinking fund gold bonds, dated July 1, 1925—		
Issued and outstanding	$1,200,000.00	
Less: held in treasury	19,500.00	1,180,500.00
Net worth		
7% cumulative preferred stock, series "A"	$ 490,700.00	
7% cumulative preferred stock, series "B"	400,000.00	
	$ 890,700.00	
No par common stock: 30,000 shares stated at book value at date of organization	1,788,523.25	
	$2,679,223.25	
*Deduct: Deficit November 30, 1931	421,999.23	2,257,224.02
Total liabilities		$3,558,666.41

*Includes direct charges of $43,235.97 representing assets charged off.

Report Optimism at Meeting of Gypsum, Lime and Alabastine

A SPIRIT of optimism prevailed at the shareholders' meeting of Gypsum, Lime and Alabastine Co., held at the company's head office in Paris, Ontario, Canada, on May 9. R. E. Haire presented the directors' report as of March 21, which, with the financial statement, was adopted.

Mr. Haire referred to future possibilities of the company in reference to the current year of business prospects in the middle west, where the outlook is brighter; also in Great Britain, where business conditions were rapidly returning to normal and where the directors had under consideration the establishing of a plant. Other directors also spoke of the favorable position of the company and its opportunities for a large increase in business in Canada with the return to normal conditions. Increased trade with England was the keynote of hope. Word was received of a large order for insulating material for consignment to England while the meeting was in progress. The directors were re-elected.—*Toronto* (Ont.) *Star*.

Warner Co. Reduces Share Value

THE stockholders of the Warner Co., Philadelphia, Penn., on May 2 approved the reduction of the capital applicable to the outstanding 234,657 shares of common stock, without nominal or par value, from $3,223,708 to $1,173,285, and the transfer of the difference to acquired surplus. The effect of this change is to reduce the capital applicable to each outstanding share of common stock from approximately $13.74 per share to $5 per share. It does not affect the number of shares of common stock outstanding nor change the amount of capital applicable to the outstanding shares of $7 first preferred stock and $7 second preferred stock, both of no par value.

Recent Dividends Announced

Schumacher Wallboard pfd. (qu.)	$0.50, May 15
United States Gypsum com. (qu.)	0.40, June 30
United States Gypsum pfd. (qu.)	1.75, June 30

COMPARATIVE PROFIT AND LOSS STATEMENT OF THE NEW ENGLAND LIME CO.

Particulars	Fiscal year ended November 30 1930	1931	Quarter ended February 29, 1932
Net sales	$824,700.39	$645,695.90	$72,181.26
Cost of goods sold	627,481.41	476,321.07	60,714.89
Gross profit on sales	$197,218.98	$169,374.83	$11,466.37
Deduct: Selling and administrative expense	246,303.40	166,952.75	34,535.39
Net profit or loss from operations	$ 49,084.42†	$ 2,422.08	$23,069.02†
Other income or expense	19,704.70	17,733.57	1,872.92
Income available for interest	$ 29,379.72†	$ 20,155.65	$21,196.10†
Interest on funded debt	72,000.00	72,000.00	18,000.00
Net loss before deductions for non-cash items	$100,379.72	$ 51,844.35	$39,196.10
Deduct: Non-cash items*	140,791.12	137,593.86	33,489.27
Net loss	$242,170.84	$189,438.21	$72,685.37

*Includes provision for depreciation, depletion and amortization of bond discount.
†Loss (before deducting non-cash items).

Economic Delusion

By J. C. Buckbee

J. C. Buckbee Co., Engineers, Chicago, Ill., and Vice-President of the Petoskey Portland Cement Co.

I BELIEVE most everyone will agree, on reflection, that the fundamental purpose of all effort in our great country is to provide 120,000,000 people with food, shelter, raiment, and a fair share of the pleasures of life. Today this effort is not functioning as usual, and I am wondering if many of our troubles are not due to a lack of clear thinking relative to what we are trying to accomplish.

We commonly think of business as an effort to make money. We commonly think of a corporation as aggregation of capital the sole purpose of which is to make a profit. Fundamentally, neither of these conceptions is true, for business is merely the machinery we have developed for providing people with work, and a corporation is merely a convenient method we have developed to facilitate the conduct of business.

Our thought differs from that of the older countries in that *we glorify work*. While we all enjoy respite from work for brief periods, there is nothing more appalling to the American man than the thought of being permanently out of work, irrespective of his financial condition. To be out of work, or, as we more often say when speaking of executives, out of business, is to be practically isolated. Our conception of the maximum of pleasure is more business than we can care for, as much as we may complain during such periods of how hard we are working and how much we are looking forward to the day when we will be able to rest.

The glorification of work has resulted in our making more progress in 140 years than any nation in all history in all time; but our restless constant endeavor and failure to reflect upon what "it is all about" has resulted from time to time in a disarrangement of our economic machinery that has frequently wiped out much that we gained.

Controlled Prosperity

The problem before us today is to devise thought for controlling our activities so that we shall have in the future lower peaks of prosperity and more shallow valleys of depression, for in peaks of prosperity we lose sense of proportion and that inevitably leads to destruction and unhappiness, if indeed not actual want for many.

It is clearly the duty of our business executives to lead in the formation of a line of thought that will keep our ship on a more even keel and our people more steadily employed; for legislative action and reforms follow rather than precede our needs.

It would seem that one of the greatest steps that manufacturers and producers of raw materials could take toward the stabilization of industry would be to free themselves of the delusion that large tonnage or approximately full capacity operations are necessary to secure a profit. As I discussed this factor in the April 23 and May 7 issues of Rock Products in considerable detail, I will not devote further space to it now, although there is much more to be said on the subject, and I would recommend that everyone analyze their costs often along the lines suggested in the May 7 article.

Another great move toward stabilization would follow the constant refusal of business that does not show a profit, for tonnage taken at less than cost leads to demoralization of the entire market and invariably acts as a "boomerang" that returns to smite its owner.

Steady Prices the Goal

Steady prices always contribute to stability, and, while we are bound by *Tradition* to make some concessions in prices when business is slow, the less variation in prices, the more steadily business will carry on; so the habit of making a fair price and "sticking to it" would unquestionably be most constructive.

If, in purchasing, we refrained from crowding the seller and treated him as we like to be treated when selling our product, there would be less sharp practice and more fair values established. Buying at as low a price as responsible people are willing to sell for, but not asking anyone to accept business below cost, is the only sound basis upon which to purchase, as any temporary advantage gained by purchasing goods at less than cost will be offset later on by disturbed conditions that hurt everyone, and in the end we are sure to be caught in our own net.

If we regarded "Competition" not so much as a free-for-all fight, where everyone tries to guess the other fellow's price and make a lower price, but more as a contest for business where quality of product, service, reputation and other merits are considered along with price, the result would be an effort to improve quality, as well as lower cost; for mere low price usually means poor quality or service that make the goods more expensive to the user than goods at a higher price from a better source.

Pride in quality of product, service, responsibility, and integrity always result in progress and satisfaction. Refusal to consider as competition firms who do not stand constantly on these principles, would soon place irresponsible concerns out of the running.

The Business Executive's Responsibility

In few words, it would seem what we need most is the general adoption in business of a "live and let live" policy.

I appreciate there are some who will say the above suggestions are mere platitudes that have no place in practical business endeavor. Of such persons I would inquire: What do you propose to do to better conditions in the future? And how long do you expect our workmen, who are looking to our executives to provide them steady jobs, are going to stand for the mismanagement of industry and finance that has resulted in the present depression?

The responsibility for keeping our people employed rests squarely upon the executives of our business enterprises; and there is no escaping that responsibility.

The bankers and governmental agencies are but the servants of business. Their activities merely reflect the demands of business and public sentiment. When our business executives rid themselves of the Volume Delusion, refuse to sell at less than cost, and adopt a "live and let live" policy, we shall have steady, profitable business, regular employment of our people, and our executives will have proven themselves capable of the responsibility they have assumed.

No executive had to take his job. He aspired to it and worked hard to get it. It is now up to these executives, one and all, to prove themselves worthy of the leadership with which they have been entrusted. Constructive action, rather than destructive competition, will be the keynote of success in the future.

Learn from Nature!

A FRIEND recently told the editor the following story, which carries its own moral:

"One day last summer I strolled out in the yard to a rose bush. A hornet, a bumble bee, three ants and two small butterflies were busily at work taking nectar from the flowers, and each, as he exhausted a flower, moved on to another. None tried to take the other fellow's flower or interfere in the least with another fellow. Indeed, on the contrary, the hornet worked around the others, although he could easily have destroyed all of them."

Traffic and Transportation

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week ending May 14:

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

25224. **Crushed stone** (trap rock) (See Note 3) from Westfield, Mass., to Jamesville, Worcester and North Grafton, Mass. Present, 90c per net ton; proposed, 84c. Reason—To meet competition from nearby quarries thereby insuring movement by rail.

25264. **Stone, broken or crushed,** in bulk, in gondola or other open top cars, carloads (See Note 3), to Pawtucket, R. I. In cents per net ton.

From (representative points)	Pres.	Prop.
Branford, Conn.	130	105
East Haven, Conn.	135	105
East Wallingford, Conn.	125	105
Meriden, Conn.	130	105
New Britain, Conn.	130	105

Reason—To meet local ledge competition.

25266. **Stone, agricultural, ground,** carloads, minimum weight 40,000 lb., from Byron and Houghton, Me., to stations on the B. & M. R. R. Present, sixth class; proposed, 1c per 100 lb. over rates on lime, carloads, from Rockland, Me., to B. & M. territory. (See Note 5.)

25288. **Crushed stone** (trap rock), carloads (See Note 3), from Winchester, Mass., to Worcester, Mass. Present, 90c per net ton; proposed, 84c. Reason—To establish a rate from Winchester comparable with rates from other shipping points.

TRUNK LINE ASSOCIATION DOCKET

29116. **Gravel,** carloads (See Note 2), from Portland, Penn., to points in Penn.

To	Prop. rates	To	Prop. rates
Tobyhanna	$0.80	Kingston	$1.00
Nay Aug	.90	Bloomsburg	1.20
Scranton	1.00	Clarks Summit	1.00

(See Note 5.)

29121. **Crushed stone; screenings, crushed stone and crushed stone tailings** (See Note 2), from LeRoy and Lime Rock, N. Y., to Burtville, Penn., $1.40 per net ton. Reason—Proposed rate is comparable with rate from LeRoy, N. Y., to Gold, Penn.

29084. **Stone, natural** (other than bituminous asphalt rock), **crushed,** carloads (See Note 2), from LeRoy, N. Y., to Millerton, Trowbridge, Jackson Summit, Tioga, Mitchell, Mill Creek, Lambs Creek and Mansfield, Penn., $1.30 per net ton.

29139. **Ganister stone,** carloads (See Note 2), from Reedsville, Penn., to Mt. Union, Penn., 85c per net ton. Reason—Proposed rate is fairly comparable with rate from Flowing Spring and Moores Mill, Penn.

29140. **Sand,** other than blast, engine, fire, foundry, glass, molding, quartz, silex or silica, carloads (See Note 2), from Highspire, Penn., to Lancaster, Penn., and York, Penn., 80c per net ton. Present rate, 85c. (See Note 5.)

29145. **Crushed stone,** carloads (See Note 2), from Jamesville and Rock Cut, N. Y., to Onchiota, N. Y., $1.70 per net ton. Present rate, $2.10. (See Note 5.)

29146. To revise commodity description now reading: "**Sand,** viz., **sea,** carloads," in connection with rates applicable from Brooklyn, Long Island City, Lighterage, New York City, N. Y., Jersey City, N. J., etc., to various N. Y. C. R. R. and W. S. R. R. stations in Items 19525 to 18640, inclusive of N. Y. C. R. R. Tariff I. C. C. N. Y. C. No. 16247 and W. S. R. R. Tariff I. C. C. W. S. No. 6630 to read: "Sand, common, sea, carloads," minimum weight 40,000 lb.

29149. **Crushed stone and screenings and crushed slag,** carloads, in open top cars (See Note 1), from Buffalo, N. Y., to Wyside, Penn., $1.30 per net ton. Emergency charge not included. (See Note 5.)

29150. **Crushed stone, coated with oil, tar or asphaltum,** carloads (See Note 2), from Tyrone Forge, Penn., to Harrisburg and Marysville, Penn., and from Martinsburg, W. Va., to Marysville and Duncannon, Penn., $1.50 per net ton. (See Note 5.)

M-3021. **Roofing granules,** viz., **crushed gravel, crushed slag, crushed stone, crushed slate or iron ore tailings,** carloads, minimum weight 60,000 lb.

To	From Rutherford, N. J. Prop. rates	From Tuckahoe, N. Y. Prop. rates
Manville, N. J.	$1.40	------
Maurer, N. J.	1.40	------
Bound Brook, N. J.	1.40	------
Baltimore, Md.	2.77	------
Fulton, N. Y.	3.00	------
Genasco, N. J.	1.40	------
Lockport, N. Y.	3.28	$3.28
Niagara Falls, N. Y.	3.28	3.28
North Tonawanda, N. Y.	3.28	3.28
Philadelphia, Penn.	1.80	------
York, Penn.	2.77	------
E. Walpole, Mass.	3.40	------
Millis, Mass.	3.40	------

28559. **Sand, blast, engine, foundry, molding, glass, silica, quartz or silex,** carloads (See Note 2), from Hancock and Round Top, Md., to Barking, Penn., $1.95, and Clarksville, Penn., $2.10 per net ton.

29076. **Stone, natural** (other than bituminous asphalt rock), **crushed,** carloads (See Note 2), from West Nyack, N. Y., to Warwick, N. Y., $1.10 per net ton.

29169. **Crushed stone and screenings,** carloads (See Note 2), from Water Street, Penn., to Pittsburgh, Penn., $1.30 per net ton. (Present rate, $1.75.) Reason: Proposed rate is comparable with rates from Union Furnace, Penn., to Butler, Keating, Summit and Sharpsburg, Penn.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason—To meet motor truck competition.

Note 5—Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

29171. **Sand,** other than blast, engine, fire, foundry, glass, molding, quartz, silex or silica, carloads, **crushed stone,** carloads, and **gravel,** carloads (See Note 2), from Tioga St., Philadelphia, Penn., to Pennsgrove, N. J., 90c per net ton. (See Note 5.)

29172. (a) **Slag, crude or crushed,** in bulk, carloads. (b) **Slag, coated with oil, tar or asphaltum,** carloads (See Note 2), from Sparrows Point, Md., to Norfolk, Va. (a) $2.15 and (b) $2.25 per net ton. (See Note 5.)

29175. (A) **Building sand,** carloads, (B) **Sand, blast, engine, foundry, molding, glass, silica, quartz or silex,** carloads (See Note 2), from Mapleton District and Tatesville, Penn., to Newark Valley, N. Y. (A) $2.70 and (B) $3.10 per net ton. Reason: Proposed rate is comparable with rates from Mapleton District to Solvay, Syracuse and Buffalo, N. Y.

29178. **Slag, coated with oil, tar or asphaltum,** in bulk, carloads (See Note 2), from Sparrows Point, Md., to Middletown, Harrisburg, Mechanicsburg, Duncannon and Marysville, Penn., $1.50; New Cumberland, Lemoyne and Camp Hill, Penn., $1.35, and Sunbury, Penn., $1.70 per net ton. Reason: Proposed rates are comparable with rates to Delaware City, Delmar, Del., Atglen, Penn., etc.

29179. (A) **Crushed stone,** carloads, (B) **Broken stone,** carloads (See Note 2), from Texas, Md.:

To points in Maryland.

	Prop. rates (A)	(B)		Prop. rates (A)	(B)
Collington	85	95	Mattawoman	115	125
Mulliken	90	100	Waldorf	115	125
Hall	90	100	White Plains	115	125
Leeland	90	100	La Plata	125	135
Hills	90	100	Pt. Tobacco	125	135
Marlboro	90	100	Cox	125	135
Croome	105	115	Lothair	125	135
Cheltenham	105	115	Popes Creek	125	135
Brandywine	105	115			

Rates in cents per net ton. (See Note 5.)

CENTRAL FREIGHT ASSOCIATION DOCKET

31366. To establish on **crushed stone, crushed stone screenings and agricultural limestone** (not ground or pulverized), in bulk, in open top cars, carloads, from Narlo, O., to Lodi, 80c; Spencer, 75c; Homer, Sharon Center, Boneta, Medina, Litchfield, Fairlawn and Copley, O., 80c per net ton. Present, 90c.

31367. To establish on **slag, crushed, coated with oil, tar or asphaltum,** carloads, from Youngstown, O., to Huntington, W. Va., rate of 209c per net ton, plus emergency charge. Present rate, 480c.

31369. To establish on **sand and gravel,** carloads, from Gosport, Ind., to Shoals, Ind., rate of 100c per net ton. Route—Via C. I. & L. Ry., Mitchell, Ind., B. & O. R. R. Present, 14c (6th class).

31371. To establish on **sand and gravel,** carloads, from Mantua, O., to Rocky River, O., rate of 70c per net ton. Present, 80c.

31391. To establish on **slag,** carloads, from New Boston, O., to South Webster, O., rate of 40c per net ton. Present, 9c (6th class).

31401. To establish on **sand** (except blast core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel,** in open top cars, carloads, from Ashtabula and Ashtabula Harbor, O., to Sugar Creek, Penn., 110c via N. Y. C., Franklin, Penn., Erie R. R.; North Star, 130c; McMurray, 140c; Library, Snowden, Mifflin Jct., 150c; via N. Y. C., Youngstown, O., P. & L. E., Montour Jct., Penn., and Montour R. R.; Moon Run, Penn., 130c net ton, via N. Y. C., Youngstown, O., P. & L. E., Groveton, Penn., and Montour R. R. Present, sixth class per official classification.

31411. To cancel from N. Y. C. I. C. C. L. S. 1413, rate of 90c per net ton, on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica,** from Bremen, Glass Rock, Glenford, New Lexington, Rushville, South Zanesville and Zanesville, O. (Zanesville group points), to Marietta, O., for P. R. R. delivery, applying in lieu thereof Official Classification basis.

Sup. 1 to W. D. A. 31211. Withdrawal notice. White Docket Advice No. 31211, Docket Bulletin No. 2153, dated April 19, 1932, covering proposal to establish rate on **pulverized limestone,** carloads, from Superior, O., to points in C. F. A. territory, is hereby withdrawn from the docket.

31431. To establish on **crushed stone,** in bulk only; **crushed stone screenings,** in bulk only; **tailings,** in bulk only; **agricultural limestone,** unburned (not ground or pulverized), in bulk in open top cars only; carloads, from Buffalo, N. Y., to Forsyth, Ripley, N. Y., State Line, N. Y. and Penn., and North East, Penn., subject to emergency charge, rate of 90c per net ton. Route—Via N. Y. C. & St. L. R. R. direct. Present, 100c.

31432. To establish on **sand and gravel,** carloads, in open top cars, from Massillon, O., to Apple Creek, O., rate of 60c, to expire six months from effective date. Emergency charge not included. Present, 70c.

31434. To establish on **granulated slag,** in open top cars, carloads, to Speeds, Ind., from Pittsburgh, Munhall, Kenney Yard, Bessemer, Duquesne and South Duquesne, Penn., rate of 250c per net ton, emergency charge in addition. Present, 335c.

31435. To establish on **sand and gravel,** in open top cars, carloads, from Warwick, O., to Toledo, O., rate of 125c per net ton, emergency charge in addition. Present, 140c.

31436. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel,** carloads, in open top equipment, from Cleveland, O., to Bolivar, Baggaley, Whitney, Latta, 140c; Donohoe, 130c; Forbes Road, Andrico, Dundale, 140c; Gratztown, Elrico, East Pittsburgh, South Greensburg, 130c; Adamsburg Coll., 140c; Madison, Herminie, Youngwood, 130c; Hecla, Mutual, Mammoth, Marguerite, Yukon, Wyano, Morewood, Mt. Pleasant, Connellsville, Monarch, Mt. Braddock, 140c; Monongahela, 130c; Ontario Coll., Cokesburg, Marianna, 140c; Donora, 130c; Belle Vernon, Smock, Brownsville, Vestaburg, Blairsville, Butler, 140c; Natrona, Brackenridge, 130c; Aspinwall, Verona, 120c; Plum Creek, New Kensington, Penn., 130c per net ton. Present, 175c to Monongahela and Belle Vernon; 220c to Blairsville; 160c per net ton to Butler and Brackenridge, Penn.

31439. To establish on **crushed stone**, carloads, from Milltown, Ind., to Cynthiana, Ind., rate of 101c per net ton. Present, 105c.

31440. To establish on **stone, crushed** (in bulk) and **limestone, unburned, agricultural** (in bulk, in open top cars only), in carloads, also on **slag** (a product of iron or steel blast or open hearth furnaces), in carloads, from Black Rock, Buffalo and East Buffalo, N. Y., to (representative points), Forsyth, N. Y., 90c; Swanville, Penn., 100c; Springfield, Penn., 110c; Frewsburg, N. Y., 100c; Akeley, Penn., 100c; Starbuck, Penn., 110c; Garland, Selkirk, Titusville, Penn., 120c per net ton. Present, to Forsyth, *†100c; Swanville, Penn., *115c, †‡252c; Springfield, Penn., *125, †‡252c; Frewsburg, N. Y., *†110c; Akeley, Penn., *†125c; Starbuck, Penn., *†125c; Garland, Penn., *125, †162c; Selkirk, Penn., *140c, †162c; Titusville, Penn., *140c, †162c per net ton. Tariff Authority: N. Y. C., I. C. C., L. S. 1649 and 1546.

*On crushed stone. †On slag. ‡Wickliffe rate.

31441. To establish on **sand and gravel**, carloads, in open top cars, rates in cents per net ton:

To	From Brink Haven, O. Prop.	Pres.	From Howard, O. Prop.	Pres.
Orrville, O.	80	100	85	100
Mt. Vernon, O.	60	70	....	....
S. Loudenville, O.	60	90	70	90
Loudenville, O.	60	90	70	90
Mansfield, O.	75	90	80	90
Newcomerstown, O.	80	110	85	110
Cambridge, O.	95	110	100	130

Emergency charge not included.

31443. To establish on **stone, crushed**, having origin, destination and entire transportation within the state of Ohio, carloads. Note—For marked capacity of cars see Agent G. P. Conard's I. C. C., R. E. R. No. 218, or reissue. Rates in cents per net ton. From Shimer, O.

To	Proposed		Pres.
Mt. Oreb, O.	*70	.....	75
Williamsburg, O.	*70	.....	80
Batavia, O.	*70	†80	80
Newton, O.	*70	.....	80
Clare, O.	*70	†80	‡80
Cincinnati, O.	*70	†80	‡80

*Applies for N. & W. Ry. delivery.

†Applies for deliveries other than N. & W. Ry. delivery.

‡Applies for N. & W. Ry. delivery. Any switching charge necessary at destination to make delivery on other lines' tracks will be in addition to the rate. Route—Via N. & W. Ry. direct.

31447. (a) To establish on **stone, crushed, slag and/or gravel, coated with oil, tar or asphaltum** (Note: The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading), carloads, between points in C.F.A. territory, also from points in C. F. A. territory to arbitrary territory east of Pittsburgh, Penn., as described in C.F.A.L. Tariff 130-U, to points east of the Western Termini of Eastern Trunk Lines, rating of 16% of first class rates published pursuant to decision in I.C.C. Docket 15879. (b) To revise commodity description published in agency and individual lines' tariffs naming specific commodity rates on stone, crushed, coated with oil, tar or asphaltum, carloads, between points in C. F. A. territory, also from points in C. F. A. territory, to arbitrary territory east of Pittsburgh, Penn., as described in C. F. A. L. Tariff 130-U, to points east of the Western Termini of Eastern Trunk Lines, to read as follows:

"Stone, crushed, slag and/or gravel, coated with oil, tar or asphaltum (See Note), carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply."

No change is to be made in the present commodity rates, but the description thereof is to be revised as shown hereinabove.

31456. To establish on **limestone, unburned; agricultural; stone, crushed; agricultural limestone screenings**, in bulk, in open top cars, carloads, from Gibsonburg and Woodville, O., to Braceville, O., 135c, and Windham, O., 145c per net ton, emergency charge not included. Route—Via P. R. R., Akron, O., Erie R. R. Present, classification basis.

31464. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and **gravel**, carloads, from Indianapolis, Ind., to Brownstown, Ind., rate of 95c per net ton. Present, 100c. Route—P. R. R., Seymour, Ind., B. & O. R. R.

31471. To establish on **crushed stone** (in bulk), **agricultural limestone** (not ground or pulverized), (in bulk, in open top cars), and **limestone, unburned, agricultural** (in bulk, in open top cars), carloads, from Blanchard, O., to Urbana, Springfield, Dayton, Middletown, 80c; Cincinnati, O., 90c per net ton. Present, 100c to Urbana; 90c, Springfield and Dayton; 110c, Middletown; 100c per net ton, Cincinnati, O.

WESTERN TRUNK LINE DOCKET

1873-N. **Sand, clay, gravel, stone** and articles taking same rates as described in Item 10, W. T. L. Tariff 210 (See Note 3), from Lawrence, Kan., also points taking Kansas City, Mo.-Kan., rates, as described in Item 140, S. W. L. Tariff 162-D, to Soldiers' Home, Kan. Rates (in cents per ton of 2,000 lb.):

	From Lawrence, Kan.	From Kansas City, Mo.-Kan.
Present	74	68
Proposed	68	62

6979-B. **Silica** (pumice or volcanic ash), carloads (See Note 1), from Eustis, Neb., to Denver, Colo. Rates: Present—18c per 100 lb. (Authorized by W. T. L. Rate Advice 11008, Docket 6979, of Oct. 26, 1929.) Proposed—14½c per 100 lb.

3350-E. **Sand, stone, crushed, gravel and other low-grade heavy-loading commodities**, between stations in W. T. L. territory, also between points in W. T. L. and points in S. W. L. territories. Please refer to Docket Bulletin No. 3164 dated March 24, 1932, Docket No. 3350E. This subject has now been canceled from the docket.

SOUTHWESTERN FREIGHT BUREAU DOCKET

24754. **Bituminous rock**, from Kentucky points to points in Arkansas, Kansas, Louisiana, Missouri, etc. To establish rates on bituminous rock, crushed or ground, carloads, minimum weight 80,000 lb., except when for carrier's convenience car of less capacity is furnished, in which event marked capacity of car, but not less than actual weight, will govern (in such instances bills of lading and waybills should carry certificate over agent's signature, "car of greater capacity not available"), but in no case less than 50,000 lb. the minimum weight to be charged for on each car when the actual amount is less, from Bowling Green, Garfield, Big Clifty, Black Rock, Rockport and Summit, Ky., to points in Arkansas, Kansas, Louisiana, Missouri, Oklahoma and Texas, to which rates were approved on asphaltic limestone from Cherokee and Margerum, Ala., in Docket 23577, these rates to be based on the mileage scale prescribed by the commission in S. W. F. B. Docket 23094, using the average distance from the origins named, computed via Mississippi River crossings, Memphis, Tenn., and south, subject to the observance of the present rates to Memphis, Tenn., when to points in Arkansas, Kansas, Missouri and Oklahoma, and to New Orleans, La., when to points in Louisiana and Texas, as minima. The distances to be figured only via routes included in I. C. C. Docket 13535. That is, distances are not to be figured through points in Missouri and/or Kansas, to which no through class rates were published under Docket 13535 in S. W. L. Tariff 154 series. Rates and distances to representative points are shown below. (Ex Parte 103 increases in addition.) Rates in cents per ton of 2000 lb.

To	Miles	Docket 23094 scale	Prop.
El Dorado, Ark.	535	300	300
Oklahoma City, Okla.	794	380	380
Ord, Okla.	683	350	350
Lake Charles, La.	740	360	430
Dallas, Tex.	773	380	430
Houston, Tex.	861	410	430

In S. W. F. B. Proposal No. 23577, rates were approved on asphaltic limestone from Cherokee and Margerum, Ala., to points in Arkansas, Kansas, Louisiana, Missouri, Oklahoma and Texas, on basis of the I. C. C. Docket 23094 scale. This adjustment was designed to enable the Alabama producers to meet competition with Texas points from which rates, on basis of above mentioned scale, had been established on ready-to-lay material. It is proposed to establish rates on bituminous rock, carloads, from Bowling Green, Garfield, Big Clifty, Black Rock, Rockport and Summit, Ky., to points in the southwest to which rates have been approved on asphaltic limestone, from Cherokee and Margerum, Ala., on basis of the scale prescribed by the commission in I. C. C. Docket 23094.

ILLINOIS FREIGHT ASSOCIATION DOCKET

6610. **Crude silica sand and gravel, washed or processed silica sand** (See Note 3), but not less than 40,000 lb., from Utica and Ottawa, Ill. Rates per ton of 2000 lb.

To points in Wis.	Present Crude	Present Washed or proc.	Proposed Crude	Proposed Washed or proc.
Milwaukee	$1.40	$1.68	$1.30	$1.56
Kenosha	1.30	1.56	1.25	1.50
Racine	1.30	1.56	1.25	1.50

6612. **Crushed stone**, carloads, as named in Alton R. R. Tariff 1400T, I. C. C. A2005, from Joliet, Ill., to stations on Wabash Ry. in Illinois. Rates per net ton.

To (representative)	Present	Proposed
Curran, Ill.	$1.26	$1.22
Alexander, Ill.	1.26	1.22
Arnold, Ill.	1.26	1.22
Jacksonville, Ill.	1.39	1.22

6618. **Sand and gravel**, carloads (See Note 1), from Joliet, Ill., to Hartsburg and Emden, Ill. Present—Class or combination. Proposed—$1.13 per net ton.

6524. **Sand, gravel and crushed stone**, carloads, minimum weight as shown in Agent B. T. Jones' Tariff 420-E, from Zones 1, 2 and 3, to Chicago, Ill.:

	Pres.*	Prop.*
From Zone 1	65	59.1
From Zone 2	70	64
From Zone 3	75	69

*Plus an emergency charge of 6c.

6623. **Sand** (except silica or molding) and **gravel**, straight carloads (See Note 1), from Gravel Pit (La Salle County), Ill., Buffalo Rock, Ill., and Majestic Siding, Ill., to Marseilles, Ill. Rates per net ton. Present, 60c; proposed, 36½c on gravel, 33c on sand (no emergency charge to be added).

I. C. C. Decisions

3638. Terrazzo Aggregate Rates. The Interstate Commerce Commission, by division 5, in I. and S. 3638, stone, marble and slate from or to southern points, in a report written by Commissioner Lewis, has found not justified, without prejudice, the proposed increased rates and changes in schedules on crushed, powdered or pulverized stone, marble or slate, between points in southern and official classification territories. This finding is without prejudice to the publication, under a commodity description approved in the report, of rates on terrazzo aggregate from quarries in southern classification territory to destinations in official classification territory, and on pulverized stone from Sparta, Tenn., and Cartersville, Ga., to destinations in official classification territory in conformity with the conclusions expressed in the report.

The commission found that 12.5% of the corresponding first class rate would be proper on terrazzo aggregate. That commodity is described in the report as "crushed stone or crushed marble (terrazzo aggregate), in bulk or in bags, in box cars." Its minimum is to be 90% of the marked capacity of the car. The 12.5% basis is to apply to central territory. To destinations in trunk line and New England the commission found justified rates which should not exceed mile for mile the basis authorized to destinations in central territory. The carriers are also to provide for the publication of the suspended rates on ground or pulverized stone from Sparta and Cartersville in accordance with a revised commodity description agreed upon by the parties at the hearing. The commission said that the bases of rates approved might be made subject to the emergency increases authorized in the Fifteen Per Cent. Case, 1931.

Commissioner Mahaffie, dissenting in part, said that in his judgment the commodities in question should bear rates no lower than 15% of first class. He said the 12.5% basis was based upon precedent shown in the report.

"Many things lately have depreciated in value," observed Mr. Mahaffie, "including precedents of this character."

Rules Against State in Gravel Rate Question

DISTRICT Judge Chappell recently overruled the motion of the state of Nebraska for a new trial in the suit of the Lyman-Richey Sand and Gravel Co., against the state. The state gave notice of an appeal. Judge Chappell held that the state was not entitled to reduction in freight rates as asked.—*Lincoln* (Neb.) *Journal.*

Foreign Abstracts and Patent Review

Elimination of Deposits on Kiln Linings. E. Schirm states that iron chains attached at one or both ends of the rotary kiln, and sliding inside the drum on the lower side while the kiln rotates, break up or scrape off large deposits of material. In order to make the

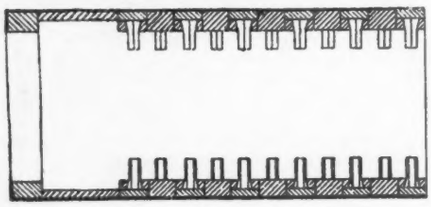


Fig. 1. Knives attached to kiln lining

chains more effective, weights are often placed between the chain links or at the suspended end of the chain. The chains have proven quite satisfactory in the preheating zone, but not in the hot zone.

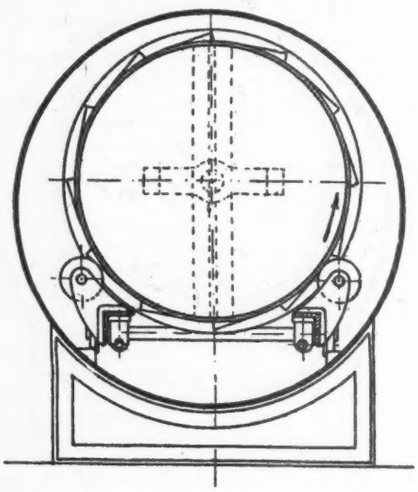


Fig. 2. Cams vibrate kiln

In place of chains, heavy loose weights may be used in the preheating zone. These are prevented from traveling through the inclined kiln by means of blocking rings in the kiln. These weights, however, crush the material too much. A weight of refractory may be used in the kiln section ahead of the sintering zone.

Iron or refractory knives (Fig. 1) may be attached to the kiln lining, which are sharp in the direction of kiln rotation so that they cut up the deposits in the preheating zone.

Formation of rings in the softening zone at the beginning of the sintering zone to the point where the kiln cross-section is reduced in area may be avoided by widening the kiln cross-section at this danger point, so that when the ring deposit has grown to the point where it starts to break up owing to its own weight, it has just filled the space provided by the widening.

The drum of the kiln may be exposed to vibrations to loosen the deposits, in that the traveling rim of the drum is provided with cams (Fig. 2) so that when the rim travels over the supporting roller the entire drum is raised and then suddenly dropped. The cams are smaller than indicated and are considered only when the drying zone, which is to be equipped with them, is separated from the remainder of the kiln.

Another method is to beat the outside of the drum in the preheating or sintering zone with impact hammers attached to the drum (Fig. 3). The hammer tips into drop position at each rotation of the drum and drops on the drum at the upper side so that the loosening of the deposits is facilitated by their own weight. More effective removal of deposits is assured by placing an impact pin through the drum wall at the zone of deposits, held in place flush with the inside of the drum wall by a spring, so that the impact of the hammer will drive the pin into the deposit and break it loose.

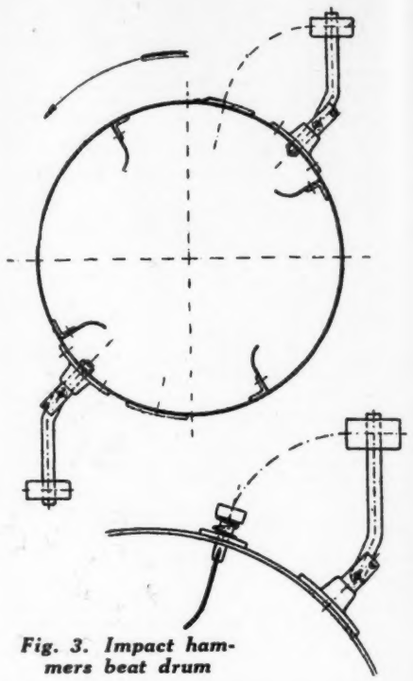
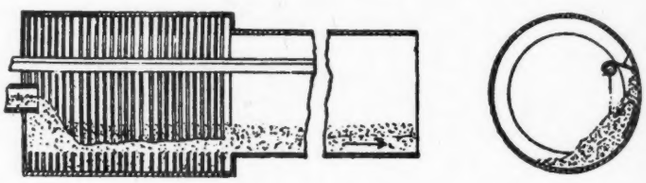


Fig. 3. Impact hammers beat drum

If impact devices cannot loosen the deposits, scrapers may be used, a stationary rod extending into the preheating zone (Fig. 4), to which a number of scrapers are attached provided suitably with springs and scraping the inside wall of the drum. But it is more difficult to use this device in the sintering zone owing to the high temperatures at the lower kiln end. However, the rod may be inserted at the charging end (Fig. 5), a metal plate shaped to the curvature of the drum being attached by way of a joint to the rod, this plate sliding at the

Fig. 4. Scrapers may be used



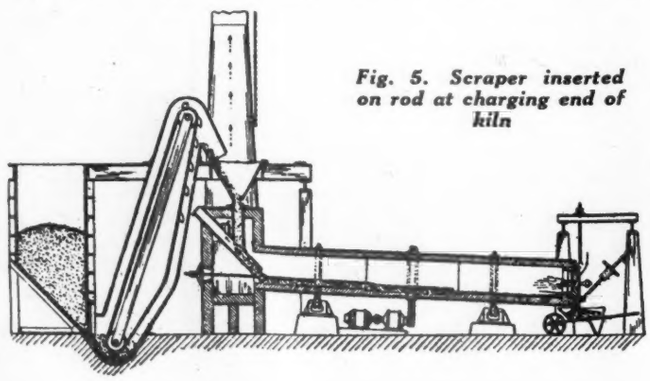
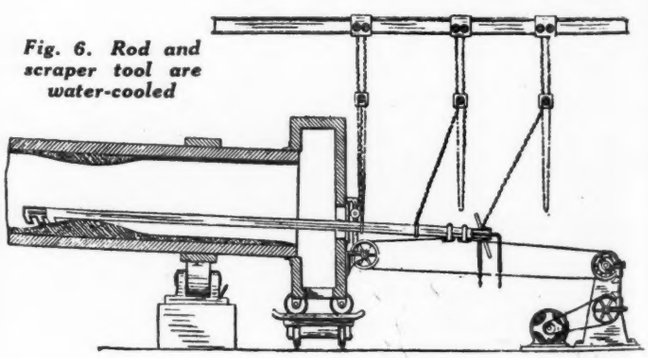


Fig. 5. Scraper inserted on rod at charging end of kiln

Fig. 6. Rod and scraper tool are water-cooled



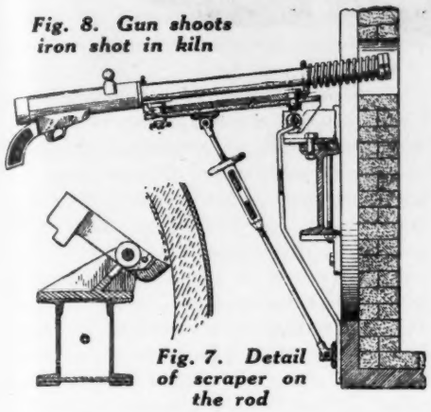


Fig. 8. Gun shoots iron shot in kiln

Fig. 7. Detail of scraper on the rod

bottom beneath the material as the drum rotates.

For periodic removal of deposits in the sintering zone, another design of scraper (Fig. 6) is used while the kiln is stopped. The rod and the scraping-off tools are water-cooled and the rod may be pulled back and forth by a motor drive. The kiln is turned a little after a part of the ring deposit has been knocked off.

Since with the above device the kiln cools too much, a device consisting of a rod with scrapers at the head (Fig. 7) is used in the sintering zone, the rod being stronger so it can be turned, and cooling water is supplied in a tube inside the rod. The kiln is turned slowly while the rod is pushed forward very slowly and steadily as though a hole were drilled on the lathe.

Guns (Fig. 8) may be installed in front of the kiln head, iron shot being discharged from it with powder or compressed air against the ring deposit, a few shots sufficing. Frequently the deposits can be removed by stopping the kiln and allowing the ring deposit to shrink due to inflowing cold air so that it falls apart; and this action may be facilitated by pouring water over the kiln at the periphery of ring deposit. If the burner can be shifted about, the deposits may be burned off, which is not possible if a cooling drum is attached to the kiln.

Ring formation may be prevented by cooling the kiln from the outside and at the trouble point, so that the material near the lining does not reach the temperature needed for deposit. The cooling zone must not be too short. Another means of prevention is to charge along with the raw material some pea-size clinker into the rotary kiln which prevents baking together of the raw material.

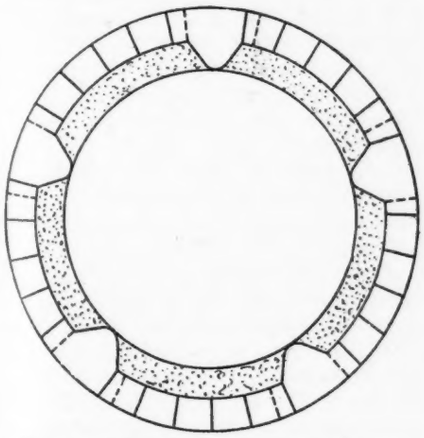


Fig. 9. Ribs cause deposits to loosen quicker

Rings of deposit may be removed by using a number of longitudinal ribs (Fig. 9) in the kiln lining which causes the deposit to loosen quicker, which method is satisfactory only for certain kinds of raw material. Another method is to install a section of cooling ring in the kiln lining within the sintering zone (Fig. 10) which requires but a small section of the kiln circumference. This method is not satisfactory either for the more troublesome material charged to the rotary kiln.—*Tonindustrie-Zeitung* (1931) **55**, 89, pp. 1233-34; 90, pp. 1247-1250.

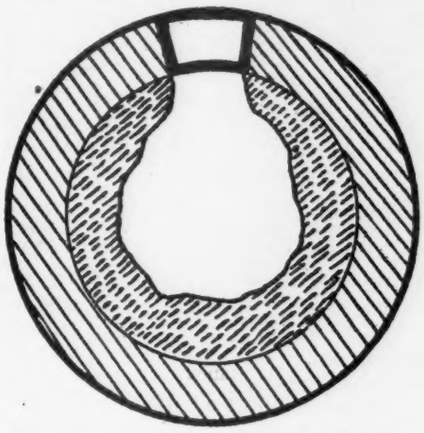


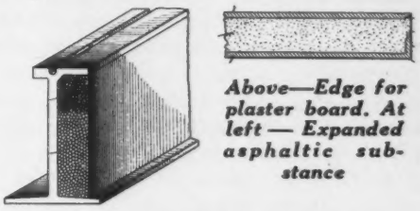
Fig. 10. Section of cooling ring in kiln lining

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Commissioner of Patents, Washington, D. C., for each patent desired.

Cement Composition. The inventor says that he has found that blast furnace slag contains great quantities of bicalcic silicate ($2CaO \cdot SiO_2$). In the process of granulation by being put into water while it is hot this compound passes from a form in which it is practically inert to a form which is active. It is well known that such granulated slag will set and harden although slowly. Inventor claims that by adding 30% of such slag to fused aluminous cement, or other cement rich in alumina, a cement is made which is of practically the same strength as the aluminous cement but which has no "set back" or diminution in strength. It is not possible to form the silica compound in making alumina cement by increasing the percentage of silica because at high temperatures this leads to the formation of an inert silica aluminate of calcium. Even better results are obtained from mixing the granulated slag with a special cement made by combining five parts of CaO with three parts of Al_2O_3 to make pentacalcic aluminate. —*Pierre Zucco, U. S. Patent No.* 1,803,582.

Plaster Board Edge. The invention contemplates a plaster board having one or more edges beveled and with edges so made as to come in contact with plaster; thus when an adjacent board is put in place the cementing material used for filling the crack between the boards will have a plaster-to-plaster contact. Part of the edge is covered with paper to give strength and to protect the edge from raveling. *John J. Turner, assignor to National Gypsum Co., U. S. Patent No.* 1,768,867.



Above—Edge for plaster board. At left — Expanded asphaltic substance

Construction Material. The patent relates to a construction material consisting of an asphaltic substance to which bubble-forming chemicals have been added to the hot matrix. The patent specifically refers to pre-formed slabs or strips for flooring, expansion strips and other uses. The sponge-like characteristics are said to be desirable in providing a slab that is resilient, readily compressed and light in weight. *Albert C. Fischer, assignor to Philip Carey Manufacturing Co., U. S. Patent No.* 1,744,714.

Portland Cement and Process for Producing the Same. This is a method of improving what is known as Super cement, that is portland cement clinker mixed with gypsum and tannic acid. The improvement consists in adding silica in a chemically active form. Trass, diatomaceous earth, blast furnace slag or some other material that has chemically active silica is added to the clinker and other materials and ground to make an intimate mixture. The silica added is to combine with any free lime and with the lime that is liberated in hydration. The tannic acid of the Super cement is thought to act as a reactive agent, maintaining the silica chemically active.—*Ellis W. Reed-Lewis, assignor to the Super Cement Co., Detroit, Mich., U. S. Patent No.* 1,805,-104.

Building Material. This patent covers a wall slab or block which has better acoustical properties than ordinary wall materials and is especially adapted to be used in public auditoriums and rooms used for similar purposes. The slab is preferably made of burned clay or shale (Haydite) and portland cement, although other materials may be used. The method of making covered by the patent is to cast the slab and then to saw or split it in such a way as to expose the surface of the porous aggregate.—*Frank Payne, Assignor to Western Brick Co., Danville, Ill. U. S. Patent No.* 1,808,905.

Bi-Partisan Public Works Relief Plan Assured

PRESIDENT HOOVER announced May 12, after conference at the White House with Senate leaders and government officials, that the way had been opened to combine and put into concrete form various plans for relief and to stimulate increased employment with a view of securing united nonpartisan action in Congress immediately.

The discussions revolved around different proposals for relief and stimulating enlarged employment, including those of Senator Robinson of Arkansas, Senate minority leader, calling for a two billion dollar bond issue, as well as plans of the President.

A prediction that Congress would act on unemployment relief measures at the present session was made May 12 by Representative Garner of Uvalde, Tex., speaker of the House, and by Senator Watson of Indiana, majority leader in the Senate.

Mr. Garner said he had been advised that measures have been under consideration at the White House providing for loans by the Reconstruction Finance Corporation to cities and states for relief purposes.

Mr. Hoover expressed confidence that a solution of the problems involved would be found, and added there was agreement at the conference that the prerequisite of any plan was the balancing of the budget.

The announcement follows in full text:

"At a conference this morning, the President and Senator Robinson canvassed the plan of Senator Robinson and the plans of the President to provide for relief and to stimulate enlarged employment. Methods were considered of combining, simplifying and putting into concrete form the different proposals so as to secure united nonpartisan and immediate action and not to delay completion of the work at this session.

"The President expressed his high appreciation of Senator Robinson's action in opening the way for unified action and his confidence that a solution will be found. It was agreed that the prerequisite of any plan is balancing of the budget."

The White House conference lasted for nearly three hours. Those attending were Senator Robinson; Ogden L. Mills, secretary of the treasury; Gen. Charles G. Dawes, president of the Reconstruction Finance Corporation; and Eugene Meyer Jr., governor of the Federal Reserve Board. Earlier, at a breakfast conference at the White House, President Hoover discussed relief plans with Senator Watson of Indiana, Senate majority leader.

After the conference, none of those who participated would comment except Senator Robinson.

"My plan was discussed," he said. "The President will make a statement. Further than that, I have nothing to say. He added that he was perfectly agreeable to the plan outlined in the President's statement.

Public Works for Trade Recovery Indorsed by Civil Engineers

A PROGRAM of public-works construction as the most effective way of increasing purchasing power, stimulating trade recovery and reviving employment was approved by the American Society of Civil Engineers in a resolution adopted by its executive committee on May 9. The action of the executive committee came as the result of an urgent appeal made to the board of direction of the society by a group of members for action by the society in the present emergency. An outline of a program of public work to stimulate trade recovery was presented to the board and it was urged, if it approved of the program, to appoint a committee vested with wide powers to represent the society in hearings upon legislation which may be considered by congress for putting such a plan or a similar plan into effect.

The executive committee, after considering the proposal approved of it and authorized the appointment of the committee.

The resolution of the committee follows:

"Whereas, all buying has been curtailed by the loss of employment and reduced incomes, fear and uncertainty as to the future, and declining commodity prices; and,

"Whereas, present trends indicate that trade will decrease and unemployment will increase until a more nearly normal purchasing power has been created; and,

"Whereas, it will be more difficult to relieve unemployment during the next year than was practicable during the past winter through relief funds obtained from public and private agencies; and,

"Whereas, a large amount of planned, productive and necessary public-works construction is now held in abeyance due to present difficulties in its financing; which if financed would aid in increasing trade and relieving unemployment; and,

"Whereas, the construction of worthy public works could be expedited by extending federal loan facilities, under proper safeguards, to solvent states, counties and municipalities; and,

"Whereas, it is more economical and advantageous for the nation and its subdivisions to meet current capital carrying charges on expenditures for productive public works than to provide for extensive, nonproductive and demoralizing doles; and,

"Whereas, there has been drafted a memorandum entitled, 'A Normal Program for Public-Works Construction to Stimulate Trade Recovery and Revive Employment,' which sets forth the principle that through such a program the restoration of normal purchasing power can be made promptly effective; therefore be it

"*Resolved,* That the American Society of Civil Engineers, through its executive committee, (1) approves in principle a normal program of public-works construction as the most effective immediate means of increasing purchasing power, stimulating trade recovery and reviving employment; and (2) urges on the Congress of the United States the enactment of the necessary legislation to extend federal loan facilities to solvent states, counties and municipalities to enable them to carry out their normal programs of necessary and productive public works."

The program for public-works construction approved by executive committee of the society includes a full statement of the effect of the present depression upon the construction industry and how in turn the falling off of construction reacts upon all business generally. Further, it points out that there is at least $3,000,000,000 of work by states, counties and municipalities that is ready to go forward if funds can be provided.

The legislation necessary to provide the funds could, according to the report, be based upon that which has already found successful application in the Reconstruction Finance Corporation—that is, the credit of the federal government could be extended to reinforce the securities of states, counties and municipalities that may be issued to finance necessary and useful public works. It is possible that this function might be assigned directly to the Reconstruction Finance Corp. or to some affiliated agency. If this be not feasible, an independent but analogous agency should be set up for this purpose.

The executive committee has urged upon American Engineering Council, upon the local sections of the society and upon the members of the construction division active support of the proposed program of public construction.—*Enginering News-Record.*

Cities Maintain Paving Programs to Furnish Jobs

ALTHOUGH cities are operating on reduced budgets, many municipalities are proceeding with normal programs of public improvements, a survey by the Portland Cement Association shows. These cities have determined that the need for jobs and the current low construction prices, which enable them to obtain upwards of one-fourth more for their money, warrant continuance of such activities as street and sewer construction.

Street construction, particularly, is being used as a means of keeping men at work. Cincinnati, with the largest 1932 street program, is spending more than $5,000,000 for that purpose, in addition to $2,000,000 for sewers. Cincinnati is concreting some 19 main thoroughfares and sections of 53 minor streets. Among other cities throughout the country stress-

ing paving programs are Jersey City, Albany, Seattle, Macomb, Ill., and Chattanooga, Tenn.

Many cities, it is pointed out by street authorities, have extensive paving programs planned for 1932, but as yet have not performed the important act of awarding contracts so that work may get under way.

The urgency for early contract lettings is shown in the large number of men kept from working through these delayed awards. Highway authorities state that concrete street paving requires as much labor as the paving of rural roads. As shown by the U. S. Bureau of Public Roads, about 90% of the money spent for concrete rural pavement goes to labor.

General Contractors Propose Construction-Revival Program

A CONCERTED DRIVE for enactment by Congress of legislation deemed necessary to remedy some of the present ills of the construction industry was made at the spring meeting in Washington on May 2 and 3 of the executive board of the Associated General Contractors. Accepting the action of the policy committee of the Construction League, which met the previous week, the association promulgated a program for reviving construction, which called for federal organization and financing of a reconstruction corporation.

Construction Program

Summarized briefly, the proposed program is as follows:

1. That the federal government, through an act of Congress, immediately create a productive reconstruction corporation.

2. That this corporation be provided with $1,500,000,000 of capital through issuance of bonds of the United States.

3. That this corporation be empowered to make loans at cost to states, cities and other public agencies to finance self-supporting and self-amortizing public improvements.

4. That preference shall be given by the corporation in making loans to projects involving: the rehabilitation of slums and the creation of better housing facilities; the construction of sanitary improvements; the modernization of obsolete public utility plants; and the improvement of public transportation facilities.

5. That all loans made shall be on the basis of self-determination, shall be properly secured, and shall contain provisions for the regular payment of interest and amortization charges.

6. That the funds of the productive reconstruction-work corporation shall constitute a revolving fund to be used during the existence of the world-wide depression.

In approving this specific plan and program the Associated General Contractors continues its approval of other similar measures that conform to it in principle. It disapproves of proposals for direct doles or subsidies even in the face of present conditions that are driving large sections of the population to despair. It maintains that, through launching of constructive works and the furnishing of employment, not only can relief from those conditions be afforded but the development of the national wealth will repay the costs of the outlay.

Legislation Approved

Foremost among the current legislative measures urged were the federal home-loan discount bank bill, the Metcalf bill for the extension of prevailing wage legislation to all classes of public construction, with a provision that the wage shall be predetermined; the Cochran bill for the creation of an administration of public works; the Blaine-Christopherson bill for uniform requirements in all government construction contractors; the emergency federal-aid highway bill for the relief of unemployment; and the bill which requires the employment of local architects on government work. The board also indorsed the retroactive repeal of the recapture clause of the transportation act, which its railroad contact committee believed is seriously hampering the development of the railroad facilities of the country.—*Engineering News-Record.*

$20,000,000,000 for Needed Modernization

IN THE LAST SEVERAL MONTHS much has been said about the reduction of inventories through surplus stocks being used up. There is also another result of the depression which is beginning to receive attention.

Continued operation of industry on reduced budgets is building up a demand that is now repressed, but which sooner or later will be insistent for replacement equipment and machinery. Curtailment of plant appropriations means an increase in the equipment in need of repairs and more obsolete machinery and equipment.

Francis Lee Stuart, noted consulting engineer and member of the Public Affairs Committee of the American Engineering Council, recently estimated that expenditures of $20,000,000,000 are needed to modernize existing buildings, obsolete plants, and rehabilitate cities and towns. He asserts there are sound, self supporting and profitable projects of construction that await approval and the impulse to get under way. These include improvement in sanitation of all kinds, water supply and distribution, sewerage and disposal plants, street paving and road building. Most of these projects could be constructed within our financial ability and with advantage under present-day costs. None are in competition with existing industries. Modernization of existing buildings and obsolete plants alone runs into almost unbelievable sums.

Mr. Stuart shows that we have not yet finished improving our own living conditions. We are just beginning to see the necessity, as a business matter, for research to find means for a more equitable distribution of things that lead to well being, and the future holds far more advances than the past. He further reminds us that "complacency, inaction, hesitation and lack of self-confidence are not the forces that made us great. The restoration of confidence transcends all other phases of our difficulties. *I believe that publicity that is understandable is the only way to change public opinion and clear away distrust.* The sooner we have it, the sooner we will be back to normal."—*Manufacturer's Record.*

Public Works Still the Mainstay of Industry

F. W. DODGE CORP. reports that of the 13 districts comprising the 37 states east of the Rockies, all but three showed higher construction contract totals in April than in March. April contract totals for the entire eastern area showed an 8% gain over March in contrast with a loss of 9% between the corresponding two months of 1931. But only slight encouragement is offered by the current pick-up, since analysis discloses that the gain was entirely due to public works, especially highways.

Metropolitan New York, southern Michigan, and the Chicago territory were the exceptions which did not partake in the April advance over March this year. The April total for the entire 37 states east of the Rockies was $121,704,800. Residential building formed $28,894,700 of this total; non-residential building formed $45,515,000, and public works and utilities amounted to $47,295,100.

Residential building gains over March of this year were shown in the New England, Chicago, Central Northwest, southern Michigan, St. Louis, Kansas City, and New Orleans districts. In the case of non-residential building, gains over March were shown only in the New England, Metropolitan New York, Upstate New York, Middle Atlantic, and St. Louis territories.

In public works the April gain over March amounted to 93%, according to the monthly statistical bulletin published by F. W. Dodge Corp.; while a year ago a loss of 14% was shown between March and April. For residential building the April contract record showed a loss of almost 13% from March, and for non-residential building April contracts were almost 8% smaller than the March awards.

National Sand and Gravel Association Directors Discuss Business Conditions

Gasoline Tax Diversion and Pending Federal Legislation Considered at Length

THE ANNUAL MAY meeting of the board of directors of the National Sand and Gravel Association was held at West Baden Springs, Indiana, May 10 and 11.

Owing to the absence of the president of the association, Harold V. Owens, Utica, N. Y., the chairman was J. C. Buckbee, vice-president of the association, Chicago, Ill. In addition to Mr. Buckbee, the following directors were present: H. N. Battjes, Grand Rapids, Mich.; Paul P. Bird, Boston, Mass.; Otto S. Conrades, St. Louis, Mo.; V. A. Cordes, Memphis, Tenn.; Alexander Foster, Jr., Philadelphia, Penn.; M. B. Garber, Lorain, Ohio; V. O. Johnston, Lincoln, Ill.; W. H. Klein, Chattanooga, Tenn.; Otto Kuehne, Jr., Topeka, Kan.; M. A. Neville, Lafayette, Ind.; F. W. Peck, Kansas City, Mo.; John Prince, Kansas City, Mo.; F. W. Renwick, Chicago, Ill., and J. M. Settle, Louisville, Ky.

The directors tentatively selected the time and place of the annual convention of the association next January but left the final decision and announcement to be made later by the executive committee of the association.

Highway Funds in Grave Danger

The seriousness of the gasoline tax diversion problem was discussed at length, and individual and collective action by all the members of the association was urged. According to the executive secretary, V. P. Ahearn, the seriousness of the situation of the whole road-building industry is not adequately appreciated, although steps are being taken to help this situation.

Secretary Ahearn also described at length the pending federal legislation with particular reference to the measures relating to public roads. He said that due to the hysterics over balancing of the budget and the unfavorable reception of the proposed emergency highway bill, the regular federal-aid bill itself was in danger of being left out of this year's appropriations. If this should happen, there would be no federal provision whatsoever for highway construction for the calendar year beginning January 1, 1933. The federal-aid highway construction appropriation of $125,000,000 per year has been a regular appropriation of Congress for several years, and while the appropriation for the present calendar year amounting only to about $80,000,000, due to the deduction of $16,000,000 (one-fifth of the special emergency road building fund of $80,000,000 appropriated in 1931), is important in itself, it is doubly so in that the states or counties must contribute a like amount in order to avail themselves of the federal funds.

Business While Not Good Might Be Worse

A very interesting and instructive session of the board of directors was devoted to reports of the various members on business conditions in the industry, and while naturally these reports could hardly be considered optimistic, they were, in many instances, not so discouraging as one might be led to believe from the various rumors being spread about the country.

In a number of localities the volume of business this year will be more than last year, even should no further efforts be made to promote public works.

Another very hopeful sign was that in one or two instances, at least, railways have begun again to purchase ballast in considerable quantities, and in at least one instance a railroad that hitherto had never used gravel ballast is now buying it in preference to crushed-stone ballast.

It developed in the discussion that the railways nearly everywhere are showing a willingness to reduce freight rates in specific cases to meet the competition of truck haulage from wayside pits. All the railway officials ask in such instances is assurance that the cut in rates is for the purpose intended and that it will not be added to the producers' profit.

The competition of ready-mixed concrete in one large middle west city has driven the sand and gravel producers to an unusual method of competition—the sale of dry batches including cement and the installation of a concrete mixer on the job, to which the dry batches are delivered. The concrete mixer is owned and operated by the sand and gravel producer who thus delivers job-mixed concrete to the contractor in place of a central plant mixture or a truck mixture.

Stanton Walker, director of the engineering and research division, submitted a progress report which was discussed at some length, ending with a decision to adhere to the present policy of the association of sticking to a search for truth rather than a search for sales arguments to be used against competitive materials.

National Ready Mixed Concrete Association Directors Meet

ON MAY 12 a meeting of the board of directors of the National Ready Mixed Concrete Association was held at West Baden Springs, Ind.

In the absence of J. E. Burke, president of the association, H. F. Thomson, vice-president, St. Louis, Mo., presided over the meeting. The following directors were present: Paul P. Bird, Boston, Mass.; Arthur C. Avril, Cincinnati, Ohio; J. L. Shiely, St. Paul, Minn., and Alexander Foster, Jr., Philadelphia, Penn.

The greater part of the meeting was devoted to a very thorough analysis and discussion of the proposed specifications of the American Society for Testing Materials for ready mixed concrete.

New British Sand Association

AT A RECENT MEETING in London, England, the advisability of forming a National Sand Association was discussed. The purpose of the proposed association would be to promote the welfare of the sand interests and also to consider tariffs on imported sand, the rating of sand quarries, railway rates, railway classification of sand, income tax, depreciation and obsolescence allowances.

The possibility of working in cooperation with the Ballast, Sand and Allied Trades Association and the Refractories Association was discussed. It was agreed to form the association and rules are to be prepared.

Crushed Stone Producer to Build New Gravel Plant

C. C. BEAM, INC., crushed stone producer of Melvin, Ohio, has purchased the farm and gravel pit near Sligo from G. T. Johnson and work will start soon on the construction of a modern sand and gravel plant, it was announced May 12. The gravel pit has been operated by the Clinton County Gravel Co.

Mr. Beam said it is the intention of the company to begin work at once on the building of the new gravel plant and it is hoped to get the new equipment in operation within the next 60 days.

"It is the company's intention to erect a thoroughly modern sand and gravel producing plant of such capacity to properly serve the needs of western Clinton county," Mr. Beam said.

"It is our plan to produce sand and gravel to meet the highest quality tests both as to mechanical and physical properties. The new equipment will be assembled in a modern steel structure having ample bin capacity to insure prompt and efficient delivery of 250 and 300 tons daily." The plans for this structure are now being prepared by the Champion Bridge Co. — *Jackson* (Ohio) *Herald*.

Ton-Mile Tax in Wisconsin on Trucks Is Upheld

THE TON-MILE tax law enacted by the 1931 Legislature of the State of Wisconsin, to apply to all motor trucks exceeding three tons in weight and operated on Wisconsin highways, has been held constitutional by the State Supreme Court.

Disagreeing with only one ruling of the Public Service Commission, which adopted regulations for enforcement of the law, the court refused to grant an injunction on petition of the Wisconsin Allied Truck Owners Association against the commission and Solomon Levitan, state treasurer.

The court held, contrary to the commission's order, that the exemption of lighter weight trucks applies to those having a net weight of 6000 lb. or less, whereas the commission construed that part of the statute to exempt only those vehicles having a gross weight, including load, of three tons.

The court rejected a contention that the law imposes an unjust burden upon interstate commerce because it applies the tax upon the Wisconsin mileage regardless of whether it is made on an intrastate or interstate trip.

"There is no attempt," the court said, "to impose a burden upon those engaged in interstate commerce that is not imposed with absolute equality upon those engaged exclusively in intrastate commerce. The suggestion that the law constitutes an infringement upon the rights of those engaged in interstate commerce, it seems to us, is worthy of no further consideration."

The court also sustained the law in its exemption from the tax of all motor vehicles "used or operated exclusively in transporting or delivering dairy or other farm products between the point of production and the primary market."

Provisions of Law

The law provides that no motor vehicle subject to the taxation section shall be operated on the highways without first obtaining a permit from the Public Service Commission, for which a fee of $5 is prescribed. The statute created a new class operating motor vehicles, according to the court's opinion, designating it as "motor vehicle hauling company," and such companies are subjected to the duty of keeping the same daily records, making the same reports and paying the same taxes required of auto transportation companies (common carriers).

A "motor vehicle hauling company" is defined as "every person, firm, or corporation . . . owning, controlling, managing or operating any motor vehicle, trailer or semi-trailer upon a public highway in this state, including operations between any points within this state and/or through the state, for the purpose of moving, hauling or transporting goods, wares, merchandise or other property for hire or consideration of any kind, under oral, written, express or implied contract, or without hire or consideration or for or as incidental to the business of the owner or operator."

Exemptions Provided

Vehicles, singly or in combination, which do not exceed three tons in weight are exempted, as are those operated by the state or its subdivisions and those operated within a city or village. Trucks carrying farm and dairy products also are exempted, as well as common carrier trucks and buses, which are covered by a separate statute.

"There can be no doubt," the court said in an opinion by Justice Owen, "that the tax imposed is for the exact purpose declared by the law, namely, a compensation for the use of the public highways and their maintenance and repair.

"Such a charge may be made by the state when it is clear that the charge imposed is for the use of the highways. While this purpose on the part of the state may appear in many different ways, it can appear with no greater certainty than when the tax imposed is in the nature of a ton-mile tax, which is a tax imposed in exact proportion to the use made of the highways."

The court held that the additional fee of $5, the receipts from which are appropriated to the Public Service Commission, along with those paid by auto transportation companies, to pay the cost of administering the law, is not unreasonable, as such enforcement may well prove costly.

Pointing out that no person using a motor vehicle for carrying passengers, whether for hire or not, is required to pay the tax unless he is a common carrier, the court held that the classification is permissible.

"It is said," the opinion stated, "that this discriminates between the person using his automobile either for hire or otherwise and the person who uses his truck for purposes in connection with his own personal affairs. This is true, but it results from the obviously permissible classification of motor vehicles devoted to the carrying of passengers on the highways and vehicles carrying freight upon the highway.

"We think it is generally recognized that the vehicle carrying freight upon the highway perpetrates greater damage upon the highway than a motor vehicle carrying simply passengers."

Concerning the exemption of vehicles used to transport farm products, the court said that "this is obviously an exemption prompted by the state's consideration of one of its most basic industries and one upon which the prosperity of the state greatly depends."

"There is a manifest difference," the opinion continued, "between imposing a tax upon one who uses the highway as a place of business, or whose use of the highway wears it out and tears it to pieces, and imposing it upon one who makes a simple and normal, traditional and necessary use of it."

An Important Decision

WISCONSIN is famous as a state of progressive legislation—too progressive, in the opinion of many, no doubt. But in this case Wisconsin may well be pointing the way out of one of the most troublesome problems confronting the rock products industry—the trucking contractor.

The trucking contractor, driven to desperation to keep up payments on his trucks, has ruined the price structure in many localities for every rock products producer and dealer. With no fixed or known transportation charge, and with the transportation cost the biggest part of the consumer price, the trucking contractor has been an important factor in demoralizing many markets for rock products.

The railways are meeting this competition in many localities by reducing freight rates, and producers are agreeing in some instances to eliminate truck hauling, but certainly the most logical solution of the problem is that now in effect in Wisconsin, of making the trucking contractor a common carrier. Eventually it will naturally lead to jurisdiction of transportation charges or truck freight rates; and we hope to an adequate fee for the commercial use of the public highways.

With the highway construction industry facing a shortage of funds for the continued construction and maintenance of highways; with the railways deprived of needed revenue for maintenance of their rights-of-way, what is more fair than to make the terms of competition between the two kinds of public carriers more fair? It will provide needed funds for road maintenance, and provide the railways with enough traffic to again return to the ranks of purchasers of construction and maintenance materials.—The Editor.

Firm Prices Aid Cement Outlook

THE FOLLOWING from the *Wall Street Journal* (New York City) is evidence that the financial interests are beginning to have a returning faith in the portland cement industry. The box insert is a part of the article as it appeared on the front pages of both the New York and San Francisco editions of the *Journal:*

"A more hopeful feeling as regards the price situation exists in the portland cement industry, although the effect of foreign importations still exerts a malign influence on the Atlantic seaboard. Producers who in the past practically disregarded the price factor in order to keep their mills going at the highest possible capacity are now adhering to the current quotation list. There have been no declines in price by eastern manufacturers since May, 1931, when the record low for the past 15 years was established.

"Since March shipments decreased 44.8% from a year ago and production is at 21.3% of capacity, cement producers see little probability of an upturn in prices in the near future. Orders from construction contractors are light, reflecting the curtailment of building operations throughout the country. The demand from road builders is showing a marked falling off in line with the policy of the different states to economize on public expenditures to minimize taxes. For instance, it is estimated that road building in New York state this year will consume less than 1,000,000 bbl., compared with 4,500,000 in 1931.

New York Price Drops to $1.54

"The current low quotation for cement is the direct result of a price war that began toward the close of 1930. During the first five months of 1931 five cuts were made.

"In the New York City territory these reductions aggregated 40 cents a barrel, bringing the price to $1.54 a barrel, packed in paper containers and less all discounts, comparing with $1.94 a barrel on January 1 of that year. The Chicago quotation declined by 46 cents a barrel and the Albany price declined by 50 cents to $1.58 a barrel during that period.

"The price war was the culmination of two years of declining demand and keen competition. Toward the end of 1930 the larger producers who had been attempting to stabilize conditions in the industry by adhering to a one-price policy were forced to the realization that their efforts were in vain. As a matter of self-preservation they were compelled to go after business in a more aggressive manner and meet the competition offered by the smaller concerns who had been shading the list quotations and thereby getting more than their pro rata share of the business available.

Concessions Will Be Localized

"Foreign importations continue to be an annoying factor on the Atlantic seaboard and some producers believe it may be necessary to establish a 'depressed price' in this market to meet the competition. While small in the aggregate as compared with total consumption of the country, these importations assume importance when they are dumped into a restricted territory and thereby cause the domestic mills serving these markets to invade other sections already well supplied.

"Also, they cause dissatisfaction among the local dealers who are forced to meet the competition of the lower priced foreign product. If the 'depressed price' policy is adopted in the larger important centers, it will be entirely local in scope and will not affect the rest of the country.

"For the first three months of the current year production of the mills of the United States amounted to 13,844,000 bbl. as compared with 20,860,000 bbl. in the corresponding period a year ago, a decline of 33.6%. In the same period shipments declined from a year ago by 38.2% to 10,484,000 bbl. At the close of March of this year stocks on hand totaled 27,530,530 bbl. as compared with 29,676,000 bbl. on March 31, 1931."

Stability Cheers Trade

WHILE DEMAND for portland cement does not presage any immediate increase in price, the industry is in a more hopeful frame of mind. There have been no reductions in price by eastern manufacturers since last May, when the present low level for 15 years was established.

Imports of cement are annoying United States manufacturers who may consider a "depressed price" advisable to maintain their trade positions in the larger import centers, but any such action would be strictly localized.

Sharp curtailment in general construction and road building is reflected in a decrease of 44.8% in March shipments from a year ago and a decline in operations to 21.3% of capacity. At the end of March, 1931, operations were at 36.9% of capacity.

Program of Lime Association Convention

THE PROGRAM of the 14th annual convention of the National Lime Association to be held in Cleveland May 24-25 has been announced as follows:

TUESDAY MORNING

Reading of minutes of last annual meeting.
Appointment of committees.
Report of treasurer.
President's opening address — Norman G. Hough.
"Whither Are We Bound?"—Col. Willard T. Chevalier, publishing director, *Engineering News-Record.*
"Oiling Sales Machinery"—Stanley Newman, treasurer, Stanley Newman Co., Boston.
Discussion.

AFTERNOON

Symposium on Merchandising:
"Is the Lime Industry Over-Produced?"—Donal O'Connor, general sales manager, Rockland and Rockport Lime Corp., New York.
"Successful Selling Based on Facts and Confidence"—Thomas L. Read, special representative, Kelly Island Lime and Transport Co., Cleveland.
"Type of Salesmanship Most Effective"—George I. Purnell, general sales manager, American Lime and Stone Co., Bellefonte, Penn.
"Effect of Sales Promotional Meetings"—J. M. Deely, vice-president, Lee Lime Corp., Lee, Mass.
"Potential Lime Tonnage in the Field of Sanitation"—W. V. Braumbaugh, assistant secretary, National Lime Asociation.

EVENING

Annual Banquet.
"How Business Revival Must Come"—Dr. David Friday, economist, Washington, D. C.
"Cabbages and Kings"—Rev. Dr. Joel B. Hayden, Western Reserve Academy, Hudson, Ohio.

WEDNESDAY MORNING

"A Pioneer's View of the Agricultural Lime Market"—H. D. Wheeler, Ph.D., Sc.D.
"Economic Aspects of Accident Prevention"—Thomas J. Quigley, inspector mines and quarries division, Pennsylvania Department of Labor and Industry.
Discussion.
Reports of committees.
Election of directors.

AFTERNOON

"Our Industry Problems and Policies"—Charles Warner, president, Warner Co., Philadelphia.
Budget for fiscal year 1932-33—Norman Hough.
Discussion of Budget.
Report of Board of Directors.
Other business.
Adjournment.

Issues Booklet on Institute Activities

"THE Institute of Quarrying (England) What It Has Done for the Quarrying Industry" is the title of a booklet recently issued by the Institute. The general activities are reviewed. Information is then given on technical activities, "protection" for the industry, silicosis insurance for the sand and gravel industry, protecting the sand and gravel industry from unfair trading, the exhibition of quarry plant and machinery, the benevolent fund and unemployment bureau.

Check Effect of Blasting

THREE representatives of the Marble Cliff Quarries Co., Columbus, Ohio, appeared before the Upper Arlington Village Commission recently, offering in "every way possible" to aid in stopping the damage which residents of the village claim is being done to their homes by blasting in the quarries near by.

W. H. Hoagland, president of the company, exhibited records the company has kept since 1926. These show that charges ranging from 150 to 12,000 lb. of dynamite have been set off, and that complaints have been received on the small and intermediate charges as well as the large ones.

The quarry delegates also said that they would welcome inspection of the amount of charges and other details by a representative of the villages.

In an effort to check the effect of the blasts, quarry workers are being stationed at points throughout the village with "pins" for testing.

Mr. Hoagland said that these steel pins had been placed on a glass base in the company offices at the quarry and remained upright after a charge had been exploded.—*Columbus* (Ohio) *Citizen.*

Open New Mica Plants in North Carolina

TWO NEW mica washing plants have just been put into operation, one in Macon county, N. C., near Franklin and the other in Jackson county, near Balsam, State Geologist Bryson reports. These plants represent an investment of between $15,000 and $20,000 exclusive of the property and have a capacity of about 10 tons of mica a day.

Another new mineral industry is also in prospect for Macon county, with the erection of a plant to develop a Kyanite deposit and manufacture Kyanite concentrate for the refractory trade. This particular deposit also has much red garnet in it, which is in demand in the abrasive industry.—*Goldsboro* (N. C.) *Argus.*

Contracts for Pumice

RECENTLY, Fred Vogel of McPherson, Kan., signed a contract with the Dodson Cement Board Co. of Wichita, whereby the company will take silica from his farm. The company will pay for a minimum amount of the deposit monthly under their contract with Mr. Vogel, paying 50c. a cu. yd. for it. The company pays for all labor used.

The deposit of silica is a pumice and is known to extend over three acres and lies in a vein from 3½ to 5 ft. thick, 8 to 18 in. under the surface. It is found in powder form, and practically ready for use when sacked.—*Salina* (Kan.) *Journal.*

"Brad" D. Pierce, Jr.

BRADFORD D. PIERCE, JR., one of the founders of the National Crushed Stone Association, formerly president of the Connecticut Trap Rock Quarries Co., New Haven, Conn., died at his home in Bridgeport, April 18, following an illness of about four months resulting from a heart attack.

"Brad" Pierce is vividly and kindly remembered by all the old timers in the crushed stone industry as a very active worker in the National Crushed Stone Association and as a colorful personality.

His father, Bradford D. Pierce, Sr., was a pioneer in the building of macadam roads in New England and in his footsteps the son early founded the B. D. Pierce, Jr., Co., road builders, of Connecticut. Late in 1890 he opened one of the earliest commercial

B. D. Pierce, Jr.

crushed-stone quarries at Bridgeport, Conn., using the product for street construction in that city. About 1900 he purchased a trap rock quarry at Middlefield, Conn. The plant was enlarged and a contract secured to supply the New York, New Haven and Hartford Railroad Co. with ballast for its Shore Line division between New Haven and New London. Two years later, in 1902, largely through Mr. Pierce's effort, a number of trap rock producers in Connecticut were brought together and their holdings merged to form the Connecticut Trap Rock Quarries, Inc. Mr. Pierce became its first president and continued in that position until 1925 when he retired from the crushed-stone business and sold the properties to the present Connecticut Quarries Co., Inc.

After retiring from the crushed stone business Mr. Pierce continued active in other lines forming the B. D. Pierce, Jr., Co., with offices in Bridgeport, Conn., to engage in the insurance and investment business.

Cement Purchasing by Oklahoma Is Abandoned

PURCHASE of cement in 1,000,000 bbl. lots by the state highway commission of Oklahoma for the construction of the state roads will probably be abandoned, it is believed by contractors of that state, following the announcement of the commission that its policy for 1932 will be small lettings every week with contractors furnishing their own cement on concrete paving jobs.

Rush New Plant to Completion

WORK is being rushed to complete the new $1,000,000 gravel plant of the Construction Materials Co. at Ferrysburg, Mich.

Production of gravel at the old plant recently started and the two works present a busy scene.

An official opening for the new plant is planned. The plant, with its towers of steel visible for miles around, is lighted brightly every night as workmen work late hours to speed the work.—*Muskegon* (Mich.) *Chronicle.*

Fire Destroys Towboat

THE TOWBOAT *B. M. Armstrong* of the Central Sand and Gravel Co. fleet was destroyed by fire in Memphis, Tenn., recently.

The boat had been tied up at the company's landing for the past year, serving as a relief boat for the *W. W. Fischer.* On board at the time the fire was discovered was the watchman, who was forced to jump into the river to escape.

Owned by the company since 1916, the boat had been completely overhauled in 1920, when her name was changed from the *E. A. Voight* to the *B. M. Armstrong.*

W. E. McCourt, manager of the company, estimated the damage at $40,000.—*Memphis* (Tenn.) *Commercial.*

Coal Dust Explosion Injures Man at Cement Plant

E. W. BROWN considers himself lucky. Although he suffers a broken left leg and is burned seriously on the face and arms, Mr. Brown realizes how closely he came to death recently when explosion of a coal dust tank in the kiln room of the Dewey Portland Cement Co. at Linwood, Ia., hurled him 40 ft. to the ground.

The coal tanks are 40 ft. above the ground and feed the coal dust to the kilns 20 ft. below. Mr. Brown was on the top of a tank as it was being cleaned. Coal dust, ignited by the flames, exploded as the tank was opened. Despite his injuries he gives thanks that the explosion was terrific. Had he fallen directly down from the tanks he would have been burned to death on the kilns, but the explosion hurled him clear.—*Davenport* (Ia.) *Democrat.*

Spring Meeting of the American Society for Testing Materials Committee on Cement

A WELL ATTENDED meeting of Committee C-1 on Cement of the American Society for Testing Materials was held at the U. S. Bureau of Standards in Washington, D. C., on March 1. The committee gave consideration to the various proposed modifications in the Standard Methods of Testing Cement (C 77-30), and in the Manual of Cement Testing, the proposed revisions being largely intended to express more definitely some of the specification requirements, to somewhat liberalize certain tolerances for apparatus and to care for some of the questions and suggestions which have come to attention during recent months. Certain of these suggested revisions are now being submitted to letter ballot of the committee.

The section which is studying the effect of temperature of cement at time of use has prepared an interesting report which it is planned to include in the 1932 *Proceedings* as an appendix to the annual report of the committee.

The Cement Reference Laboratory reported a very considerable increase recently in the volume of work incidental to the almost completed second tour of inspection of cement laboratories.

Fire Damages Plant of Consolidated Rock Products

BELIEVED to have been caused by a spark from a blow torch that was in use nearby, fire broke out recently at the Consolidated Rock Products Co. plant at Prospect St. and Walnut Ave., Orange, Calif.

One locomotive and four cars, in addition to other minor equipment, were damaged.

O. V. Barkman, district manager, said that all orders will be filled, as the company has a 30,000-ton storage of all sizes and materials of rock.—*Orange* (Calif.) *News.*

Asks State to Operate County Crushers

RONALD SLAGEL and W. A. Drake, representatives of the Cushing, Okla., Chamber of Commerce; John Raedeker, member of the Payne County Board of Commissioners, and J. W. Flint, city manager, recently requested the Oklahoma State Highway Department to take over the operation of the rock crushers now being used by the city and county.

The crushers have been operated by the city and county but both units are now practically out of funds which may be used for this purpose and will likely have to abandon use of the crushers.—*Cushing* (Okla.) *Citizen.*

Cement Manufacturer Changes Name

THE International Portland Cement Co., Ltd., with offices in Spokane, Wash., and plant at Irvin, is changing its name to Spokane Portland Cement Co. Capital stock authorized is $3,000,000. Amendment to the company's articles of incorporation for the change in name has been filed with the secretary of state.—*Spokane* (Wash.) *Spokesman.*

Government Engineers Take Course in Concrete

FORTY-THREE engineers representing seven offices of the United States Army Engineers Corps attended a course in field control of concrete conducted in the Portland Cement Association laboratory, Chicago, May 2 to 7. This is the fifth consecutive year that the course has been held for engineers in charge of flood control and navigation construction projects on the Mississippi and its tributaries.

The course consisted of lectures, round-table discussions, and laboratory practice dealing with concrete mixtures designed for use in flood control and navigation structures. Subjects covered included physical properties of concrete and their development; relation of cement, aggregates, and water to properties of concrete; field problems of water-cement ratio control; preparation and testing of job control specimens; and the importance of proper curing. Aggregates in local use in the several river districts were tested as part of the course and were incorporated in various mixtures.

More Highway Funds Asked in New York

A VIGOROUS campaign is being waged by highway contractors of New York to bring about a special session of the legislature for the purpose of restoring the appropriations for 1932 highway construction to the amount originally planned. The legislature at its regular session set up a highway budget some $33,000,000 below that for last year and, in addition, increased the gas tax from 2 to 3 c. and provided for a diversion of approximately $49,000,000 of it to other purposes than road building.

The New York State Construction Council, an organization composed of all elements in the industry, is conducting the campaign and is establishing contacts with the people of the entire state. Calls are being made and literature distributed to show that the construction of highways is a great factor for the relief of unemployment because of the large amount of the funds which are paid to labor. All citizens are being urged to write to the governor asking that a special session of the legislature be called to restore the highway funds.

Report Talc Deposits

VALUABLE DEPOSITS of talc are located in Bouquet Canyon on lands owned by the Los Angeles, Calif., Department of Water and Power, and that department has asked the city council to authorize the employment of Frank R. Wicks and George Ames to make the tests, the *North Los Angeles Herald* reports. Mr. Wicks is a consulting and mining engineer and Mr. Ames is head of the Pacific Talc Co.

M. W. Babb Named President of Allis-Chalmers

MAX W. BABB was named president of the Allis-Chalmers Manufacturing Co. recently, succeeding Otto H. Falk, who becomes chairman of the board. W. A. Thompson, formerly comptroller, and William Watson, general works manager, were named vice-presidents. Mr. Babb was formerly general counsel for the company.

Litigation Over Dust Causes Cement Plant to Close

RATHER than face a long drawn-out lawsuit the Cowell Portland Cement Co., San Francisco, Calif., closed its Cowell plant May 3.

Suspension of business by the company is attributed by officials directly to threatened litigation with the county board of supervisors over alleged damage to Clayton Valley farm lands.

Suit seeking abatement of the Cowell plant as a public nuisance was filed recently by District Attorney Hoey.

Filing of the suit followed receipt of a petition signed by 200 residents of the Clayton Valley district urging such action.

Following announcement that the plant was closing the district attorney announced that legal action has been indefinitely postponed but that the moment the plant resumes operations its manager would be served with notice that suit had been filed, the *Stockton* (Calif.) *Record* reports.

Brick-on-Metal Road Fails

IN 1930 a brick road was built on a metal base for experimental purposes near Springfield, Ill. The section was 150 ft. long and 18 ft. wide. A summary of the results of tests on this section were recently described in the *Engineering News-Record*, the final conclusion as reported being that a bituminous-filled brick surface must be constructed on a rigid base. Flexible bases cause loosening of the bituminous filler, thereby admitting surface water and ultimately resulting in the destruction of the mastic cushion.

Recent Prices and Contracts Awarded

Minneapolis, Minn. A bid of 37 c. per ton for sand and of 80 c. per ton for gravel made by the Landers-Morrison-Christenson Co. has been accepted by the city. Last year the lowest price for sand was 55 c. and for gravel $1.20 per ton.

Bloomington, Ind. After receiving bids for crushed stone for Monroe county roads the county commission refused them and will readvertise. The county has been paying $1.23 per cu. yd. for crushed stone. Bids submitted were for 90 c. and less.

Hartford, Conn. Bids for 48 c. per cu. yd. were submitted by the Connecticut River Sand Co. and by D. P. Mather for supplying 11,000 cu. yd. of sand to the city. The contract will be split equally between the two.

Parsons, Kan. Reed and Wheelock recently were low bidder on a section of state highway pavement. They submitted two bids; $1.83 per sq. yd. of concrete pavement with chat as an aggregate, the other $1.86 with crushed stone as aggregate. Another bid was $1.84 with chat and $1.95 with crushed rock.

Columbus, Neb. A record low bid of 29 c. per cu. yd. for gravel at the pit was recently submitted to the city for its requirements by the Columbus Sand Co. Other bids received were for 34 c. at a local pit and 40 c. delivered on the street.

Propose Cement Plant in Ireland

A PROPOSAL for establishment of a cement factory at Clarecastle, County Clare, Ireland, has been placed before the Irish Free State and the U. S. Bureau of Foreign Domestic Commerce reports, application has been made for a loan of £320,000 under the Trades Loans Act for building. Claremorris would offer both water and rail connections with the rest of the Free State, and ample raw materials for manufacture of cement are said to exist in the neighborhood. At present there is no Irish production of cement, and consumption of this product has increased steadily, amounting to over 1,000,000 bbl. in 1931; about 60% of the imported cement comes from Great Britain, 30% from Belgium and 10% from France.

It is anticipated that favorable consideration will be given to the question of establishing a domestic cement industry with government aid and tariff protection, which is in line with the declared policy of the new Free State government. However, it is reported that a number of additional proposals have been made by various organizations, including an Irish subsidiary of a large German cement producing firm, which has been registered in Ireland as Delta (Ltd.).

Demonstrates Device for Removing Rock Dust in Drilling

ON MAY 16 a demonstration of a device for removing injurious dust in rock drilling was held at the Rockefeller Center excavation in New York City. The invention of the dust remover is said to be the outgrowth of the work of the Industrial Codes Advisory Committee on rock drilling, sand blasting and rock crushing.

The device, the Kelly exhaust system developed by George Kelly, used in this demonstration has a metal hood through which the drill passes. The air sucks the dust, resulting from the bite of the drill, into a pipe, where it is taken into specially constructed reservoirs, and there the heavier particles are separated from the fine dust by means of air currents. Finally it is all settled by means of water sprays and is washed away with the water.

Investigates Possibilities for Expanding Use of Phosphate

J. M. THOMPSON, of the British Phosphate Commission, arrived in Victoria, B. C., recently to confer with Premier Tolmie and Hon. William Atkinson, Minister of Agriculture, on matters relative to the development of the market for phosphates in this province on a cost basis to the consumer.

In an interview Mr. Thompson explained that the commission, of which he is a member, operates the phosphate industry on Nauru Island for the British Government, which administers the affairs of the island under a mandate from the League of Nations.

All sales of phosphates are made on a cost basis as a means of placing at the disposal of consumers within the Empire a much-needed product at as little expense to the user as possible.

Mr. Thompson will first go to Trail to confer with officials of the Consolidated Mining and Smelting Co., and then will return to Victoria to meet members of the Cabinet. From Victoria he will proceed to Florida, which is the most productive state in the American union in the matter of phosphates. In Florida he will make a study of production and the uses to which phosphates are put.

His visit is of considerable importance to the agricultural and mining development of this country, it was learned.

Nauru Island, formerly owned by Germany, has an annual output of half a million tons of phosphates, but it is expected that production will be stepped up considerably after Mr. Thompson completes his tour for the purpose of broadening the market.—*Victoria* (B. C.) *Colonist.*

Urges Kaolin Tariff Adjustment

CHARLES H. Herty, Atlanta, Ga., representing the Georgia Kaolin Co., appeared at Washington before the House ways and means committee, urging that the Hawley bill to adjust tariff rates, be passed. Mr. Herty said: "China clay was selling at $8 per ton at the mine when the tariff law was passed and is now down to $6.60.

"Importers are paying $4.75 per ton for foreign clay, and consumption is still divided, two-thirds to the domestic producer and one-third to the imported clay, but to keep it there we must sell below the cost of production and pay less than a living wage. The depreciation of the pound in England 'eats up' the protective tariff rate on china clay," Mr. Herty declared.

Consider Lime Rock Deposit for Georgia Highways

GEORGIA highway builders are becoming interested in the recent discovery of an unusually large deposit of limerock near Perry, Fla. The analysis shows it to have a high rating as a road material, and owing to its close proximity to lower Georgia it is attracting favorable attention.

The Georgia highway department is showing interest.—*Madison* (Ga.) *Enterprise-Recorder.*

Starts Lime Mortar Plant

OLAF ARNTSEN, Milwaukee, Wis., plastering contractor, announces that he has discontinued contracting to form the Lime Plaster and Mortar Works. A modern plant, equipped with several vats for ageing lime, has been established at 3430 N. Holton street, and the company is now ready to supply the plastering trade with lime plaster and finish prepared ready for use, also ready mixed lime mortar for the mason trade.

Gypsum Production in New Brunswick

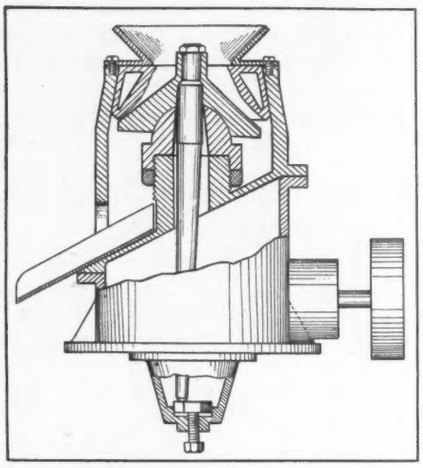
DURING 1931 New Brunswick, Canada, produced 69,259 tons of gypsum, 14% less than in 1930, owing chiefly to building conditions in the United States, a report by the U. S. Bureau of Foreign and Domestic Commerce states. An increased quantity of raw gypsum was manufactured locally into calcined plaster. Exports to the United States included 22,500 tons of crude gypsum, the balance of the output being manufactured at the local plant. With the exception of 5000 tons exported to Australia and New Zealand, the manufactured products were sold in Canada.

An entirely new operation has been opened on a site about 3 mi. west of Moncton, where a fine body of gypsum is reported, the output to be forwarded to Montreal.

New Machinery and Equipment

Gyratory Crusher

HARVEY S. ANDERSON, Rudolph, Ohio, announces patent has been granted him on a new type of gyratory crusher, the design of which is shown in an accompanying view. Features claimed for this crusher are that it contains fewer parts; that, because the fulcrum is so near the load, power requirements are low; and that it has high crushing efficiency.



Fulcrum is near the load

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Portable Troughed Belt Conveyor

THE Fairfield Engineering Co., Marion, Ohio, announces the new Fairfield portable troughed belt conveyor, built in lengths of 20, 25 and 30 ft. It is primarily intended for the handling of sand, gravel, crushed stone and other abrasive materials but it can be used for handling small sizes of coal, the manufacturer states.

The new conveyor is sturdy, light in weight, easily moved, and requires little power to operate, the manufacturer states.

Carriage wheels are mounted on roller bearings. The conveyor belt is an 18-in. wide rubber belt and runs over Fairfield ball bearing idlers. The receiving hopper plates are equipped with replaceable rubber wear strips.

The conveyor is equipped with steel skirt plates for full length and which provide a carrying trough 6 in. deep. The return belt is protected against falling materials by a steel plate formed in an inverted "V" shape.

Power is furnished by a 3-hp. ball bearing electric motor or 4½-hp. air cooled gasoline engine. Pressure lubrication fittings are provided for all bearings throughout.

For handling abrasive materials

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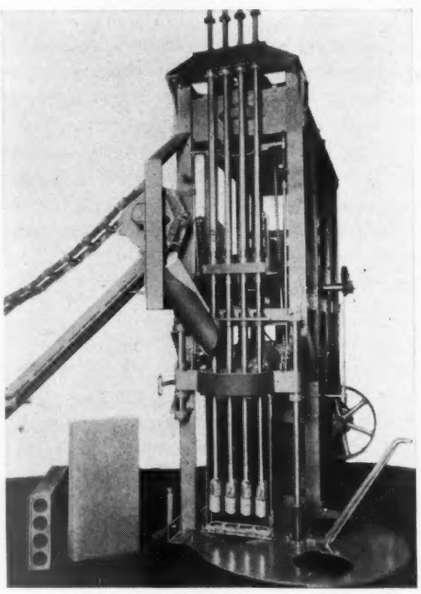
Concrete Conduit Machine

TWO DESIGNS of conduit unit, one for low-tension and the other for high-tension cables, have been perfected by the McCracken Machinery Co., Sioux City, Ia., which has also produced equipment for their automatic manufacture.



Complete unit for making conduit

The concrete units are said to be non-fusible, with extremely smooth interiors. Made in 4-ft. lengths and packed densely, they are claimed to have unusual strength. The method of compacting the concrete is the packer head process used in the manufacture of concrete sewer, drain and culvert pipe.

The machine for manufacturing these units has a capacity of 30 duct-ft. per min. of 6-way conduit, 20 duct-ft. of 4-way conduit, and 10 duct-ft. of 2-way conduit. Only five molds are required, as the concrete is packed so hard that the molds are removed immediately and, returned to the machine, re-enter the production cycle.

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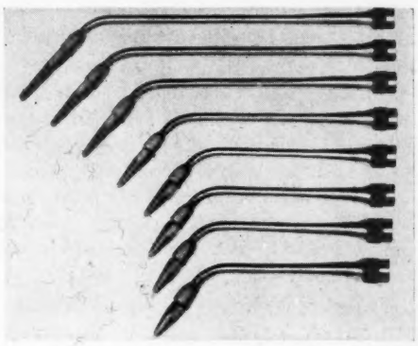
Welding Tip Adaptor

THE Linde Air Products Co., New York, N. Y., has recently added to its line of Purox welding apparatus the Purox 11-to-00 tip adaptor which can be used to increase the range of usefulness of the No. 11 welding torch.



Welding heads with detachable tips

By means of the new tip adaptor it is now possible to use the stems and tips of the Purox No. 00-D aircraft welding torch and the stems and tips of the No. 00 welding and lead burning torch on the No. 11 welding torch, thus enabling a welder who has only an occasional light welding job to use the correct welding tips for this small work. This eliminates the expense of investing in a complete light welding outfit merely for the sake of a few such jobs.

With this device, the Purox No. 11 welding torch not only takes the Purox No. 21 cutting attachment by which it is converted into a light cutting torch, but, with the new adaptor, it can handle the complete range of general welding work, with the exception only of the unusually heavy jobs.

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Concrete Pipe Machinery

"YOU should not invest any money in the concrete pipe business unless you find you have a ready market or good possibilities of developing a market for pipe; unless you are sure the added production within your territory in face of present established concerns will not result in destructive and profitless operation; and finally you must be sure that the available materials that you contemplate using in your pipe are suitable to make a first-class specification product. But don't start at all unless you have sufficient capital."

The above is the introductory paragraph in a bulletin announcing its new line of concrete pipe machinery by the Universal Concrete Pipe Co., Inc., New Martinsville, W. Va.

These machines are simple and are based on four units, separately powered, so that the machine can be set up anywhere in an existing plant without relation to line shafts, etc., the manufacturer states.

The four component parts of these machines are the drive, the tamper, the core hoist and the feeder. They are made in two sizes, one to manufacture pipe from 8 to 36 in. in diameter, the other from 24 to 60 in. Features claimed for the machines are simple design and construction, ease of operation, low manufacturing and maintenance cost.

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Safety Push Button

THE Lincoln Electric Co., Cleveland, Ohio, announces a number of improvements in its safety push button.

A feature of this switch is that the start button is inside of the stop button, as shown in the accompanying photograph. The stop button can be operated from any angle by striking the front of the control box with the flat of the hand, but the start button must be operated with the finger. With the new push button the stop button can be locked in the off position by pushing it in and twisting it to the right. Heavy springs prevent accidental operation of either button when not locked.

Easy to stop

It is claimed the button will handle control circuits up to 600 volts. The button is self contained and need not be taken apart or removed from the cover for wiring.

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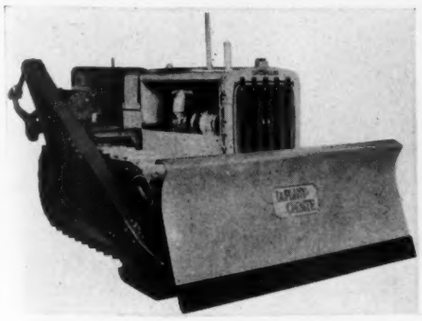
Bulldozer with Lift

THE 50 Hylift bulldozer is announced by the La Plant-Choate Manufacturing Co., Cedar Rapids, Ia. Features claimed for this new bulldozer are: 30-in. lift of blade above the ground; double acting jack which forces blade into the ground, as well as lifting it out; compact design enabling operation close to wagons, tractors, etc.; drawbar is entirely in clear, and complete ground clearance when the blade is raised.

Other improvements have also been made in the design of the various parts, the manufacturer states. The lifting mechanism is hydraulic, power being obtained from a rotary gear pump attached to the tractor power take-off.

Specifications of the blade are: length, 8 ft. 5 in.; height, 42 in.; thickness of blade, ⅜ in., and cutting edge, ¼x8 in. Net weight is 6450 lb.



Has double-acting jack

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Forced Feed Faucet

THE LE MAY forced feed faucet is announced by the Key Boiler Equipment Co., Inc., East St. Louis, Mo. This faucet should prove useful about plants handling heavy oils, greases, roof coatings, etc., from barrels. The principle of operation is illustrated in an accompanying view. It is inserted in place of the more commonly used types of faucets which depend upon gravity for discharge.

Auger draws heavy oils from container

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Manufacturer Seeks New Lines

ANNOUNCEMENT is made by the Bradley Pulverizer Co., Allentown, Penn., that it is seeking new lines of machinery and equipment to manufacture. It has invited those who have products requiring foundry and machine shop facilities in their manufacture to communicate with them. Satisfactory patented products will be purchased outright or will be manufactured on a royalty basis.

While the company has manufactured pulverizing machinery and equipment for cement plants, fertilizer plants, rock products plants, etc., it will consider other lines of merit, the announcement states.

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Low Bed Truck

A NEW low-bed, 5-ton front-wheel-drive truck with a frame height of 21 in. is announced by the Four Wheel Drive Auto Co. of Clintonville, Wis. This new FWD low-bed is adaptable to specialized hauling applications where hand-loading or unloading is necessary; where the loads are bulky or the commodities fragile. Individual rack bodies for hauling brick, tile, etc., are available in the standard or special wheelbase jobs. Stock racks, van bodies and standard stake bodies are mounted at the factory to suit the customers' requirements. The company plans also to manufacture this type of truck in other capacities.

For hand loading or unloading

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Old Manufacturer Reorganizes

ANNOUNCEMENT is made of the organization of the Poole Foundry and Machine Co., conducting the former business and plant of the Poole Engineering and Machine Co., with general offices and works at Woodberry, Baltimore, Md. The company dates back to 1843, when it started as Poole and Furgeson. The officers of the new organization are S. P. Brady, president; S. P. Brady, Jr., vice-president; and L. M. Ricketts, secretary and treasurer. Products include flexible couplings, reduction gears, machine molded and cut gears, gray iron and semi-steel castings, and machine work.

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Moves Warehouse

ANNOUNCEMENT is made by the American Steel and Wire Co. that it has moved its Chicago warehouse to new, modern quarters at 2464 S. Ashland avenue.

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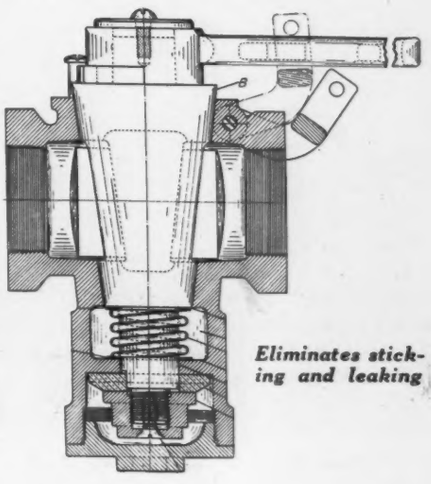
Rotary Valve

A NEW TYPE of plug cock valve is announced by J. E. Swendeman, Inc., Boston, Mass. It is claimed to eliminate sticking and leaking and does not require lubrication. Features claimed for this valve are its ease of operation and its continued tightness. It is also claimed that no maintenance is required with this valve and that it eliminates leakage. The design of the valve is shown in the illustration below.



Eliminates sticking and leaking

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Ready-Mixed Concrete and Lime Putty Sold by Gravel Producer

By Jos. C. Coyle

TWO PLANTS of the Fountain Sand and Gravel Co. serve Pueblo, Colo., with five grades of sand and gravel, and with lime putty and ready mixed concrete. One plant, with a capacity of 300 cu. yd. per day, is situated on the Fountain river, within a few blocks of the center of the city. The general offices of the firm are at this plant, which produces largely sand for the local trade. The putty and concrete equipment is also at this plant. Plant No. 2, with a capacity of 600 cu. yd. per day, is on the Arkansas river, just at the edge of the city, where a splendid deposit of several acres of gravel is available. This plant produces mostly coarse aggregate, which is supplied to the local trade, hauled by company trucks to plant No. 1 for use in the "Red-E-Mixed" concrete, and is shipped by rail to various points throughout the state.

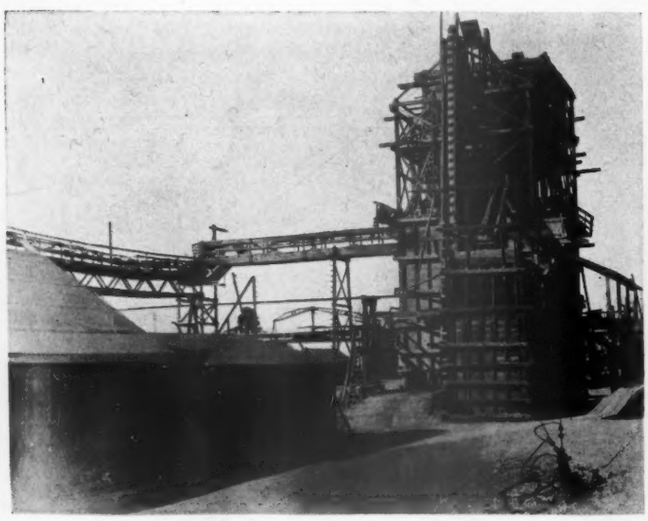
At plant No. 2 material is taken from a wet pit, several hundred yards long, by a Monighan dragline, loading into a train of Western dump cars on a track which is moved as the pit is worked. A Plymouth 8-ton locomotive pulls the train to the plant, where the cars are dumped on an 8- by 10-ft. grizzly, over the hopper of a 24-in. conveyor belt, driven by a Westinghouse 10-hp. motor, which delivers it to the No. 2 Western crusher, driven by a 30-hp. Westinghouse motor. From the crusher oversize returns to the belt, over an 18-in. special belt, 40 ft. on centers, and driven by a 5-hp. Westinghouse motor. A short gravity chute takes the oversize from belt to belt.

Between the conveyor and the crusher the material passes over a Traylor vibrating screen, with 2-in. mesh. That which goes through this screen is carried over a 20-in. belt, 200 ft. on centers, and driven by a 20-hp. General Electric motor, to the Telsmith sizing screen at the top of the plant, driven by a 20-hp. Westinghouse motor. The belt was set up at the plant, with an 18- by 24-in. tightening pulley, in an adjustable frame, beneath the lower end. The Telsmith screen separates engine and concrete sand, 1¼-in. rock and 2-in. rock. This material either passes by gravity into six 160 cu. yd. loading bins, or is bypassed to open storage, which is sufficient for 20,000 cu. yd. of rock and 20,000 cu. yd. sand.

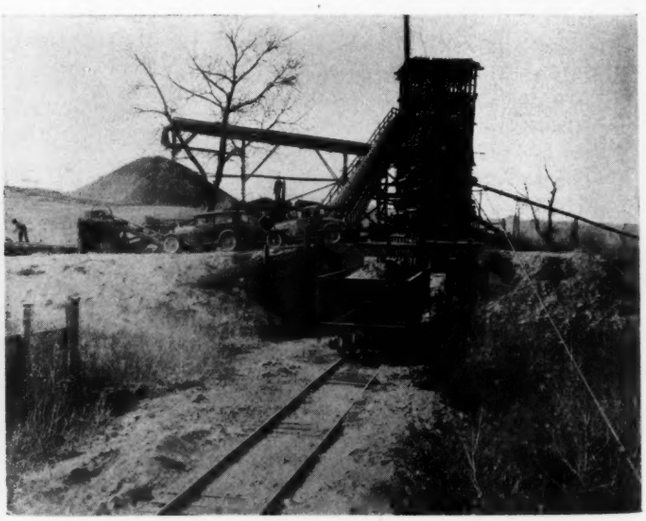
The ⅜- to 2-in. rock, in bypassing to open storage, is carried by an 18-in. belt, 22 ft. on centers, driven by a 10-hp. Westinghouse motor, to another belt, 18 in. wide and 96 ft. on centers, driven by a 5-hp. Westinghouse motor, which drops it on the storage pile. Material under ⅜-in. is spouted to the storage pile through an 8-in. pipe.

Rock is distributed over the storage pile with a 1 cu. yd. Sauerman drag scraper, and reclaimed by the same means. Sand is distributed with a ¾-yd. Sauerman drag scraper and reclaimed the same way. Both scrapers are operated by a Sauerman two-drum hoist, driven by a Westinghouse 50-hp. motor. Sand and gravel is loaded for delivery with a "Chicago Automatic" portable conveyor, capable of loading 40 cu. yd. per hour. Five company trucks are used (G. M. C., Fords) and outside trucks are hired during the busy season.

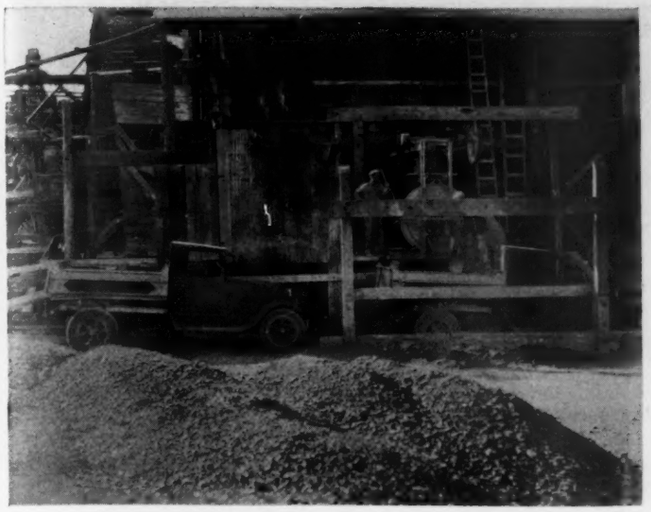
These trucks are dumped through a specially constructed grizzly into railroad cars when loading for distant points. As many as 10 cars per day are sometimes loaded in this way, some being shipped to points in Colorado and New Mexico. An ample supply of gravel is available at this plant for many



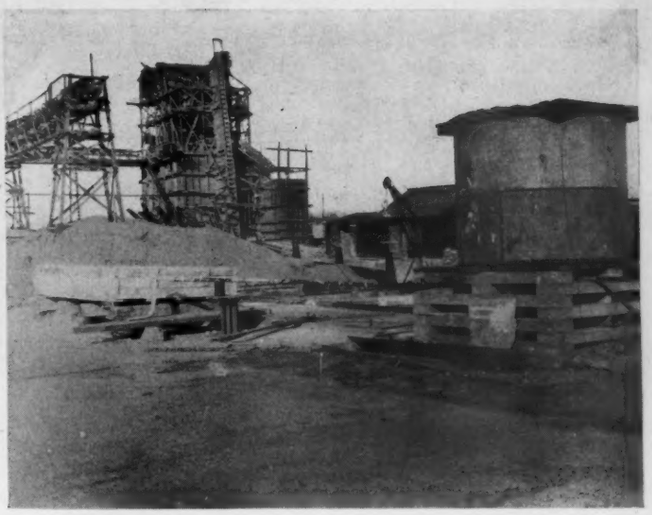
Plant No. 1 of the Fountain Sand and Gravel Co.



Plant No. 2 of the Fountain Sand and Gravel Co.



Ready-mix concrete plant at No. 1 gravel plant



Lime putty unit at No. 1 gravel plant

years to come, the bottom of the deposit, of which the firm owns 200 acres, having not yet been reached. The pit is worked to a depth of 14 to 18 ft.

At plant No. 1 material is taken from the Fountain river, close by the plant, with a dragline, loading into dump trucks. These dump into the hopper of a bucket elevator, 75 ft. on centers, with a 12-in. belt and buckets spaced 18 in., driven by a 10-hp. G. E. motor. This delivers the material to a specially constructed sizing screen, with openings ranging from 7/32 to 1 in. Rock over 1 in. passes by gravity to a 25 cu. yd. bin over the Joshua Hendy crusher, which is driven by a 20-hp. G. E. motor. Four grades of material are made at this plant, concrete sand, brick and plaster sand, pea gravel and 1-in. rock.

The rock goes by gravity to a 40 cu. yd. loading bin, while material under 7/32-in. passes by gravity over a Mitchell electric vibrating screen, with ⅛-in. openings. The pea gravel passes over this screen to a dewatering box with screw, which delivers it to a 40 cu. yd. loading bin. Sand passing through the vibrator goes to a "Good Roads" drag dewaterer. Here a drop apron is used to divert the sand to open storage when the loading bins are full. The screened sand is stored with a 14-in. conveyor belt, 64 ft. long on centers. This belt also carries pit-run, when the plant is operated on that, to a second belt, 14 in. wide by 150 ft. on centers. Auxiliary loading bins have been constructed for pit-run, considerable of which is sold at this plant. It is reclaimed from storage with a Sauerman hoist and 1 cu. yd. drag scraper and elevated to the bins with a 60-ft. bucket elevator. Five 80 cu. yd. loading bins, all told, are in use at plant No. 1, with open storage for 6000 cu. yd.

Special features at this plant are the facilities for making lime putty and the company's "Red-E-Mixed" concrete, which have been in operation four years, and have proved profitable, according to J. A. Bullen, general manager of the company. The ready-mixed concrete is prepared in a Koehring ½-yd. mixer, set up on an elevated platform at the side of the plant, and equipped with specially constructed batching boxes filled through chutes from the regular loading bins of the plant. The mix is discharged directly into steel bodied dump trucks for delivery. As the supply of coarse aggregates for this department is insufficient at plant No. 1, much of this is hauled from No. 2.

Lime is received by the carload and unloaded directly into an open slaking vat, from which it is screened and discharged by gravity into ageing vats. These are below ground and of concrete. Two pits are 10 by 16 ft. and two are 6 by 12 ft., all 6 ft. deep. Excess water is drained from the pits by 3-in. pipe, which is raised or lowered according to the height of the putty. This carries the water to a settling compartment, with screened side through which the water seeps away through an embankment of pea gravel. Putty is delivered in metal containers holding 3 cu. ft. It is removed from the vats and loaded with hinge-bottom metal buckets, hoisted with a Sasgen hand-crab hoist. Three men are able to load a truck with 25 cu. ft. in 25 minutes. A 500 gal. metal tank is used for water needed in slaking lime.

The company has a warehouse at plant No. 1, where standard and waterproof cement, brick cement, hydrated lime, etc., are unloaded directly from cars on a spur track alongside the building.

Physical Properties of Cast Stone

THE Department of Commerce has reprinted the article, "The Physical Properties of Cast Stone," a paper by John Tucker, Jr., G. W. Walker and J. Arthur Swenson published in the December, 1931, issue of the *Bureau of Standards Journal of Research*. This research work was briefly reviewed in the February 13 issue of Rock Products, page 55.

Talc and Soapstone

DETAILED INFORMATION on talc and soapstone in 1930 is contained in a bulletin recently issued by the Bureau of Mines. Composition and properties, origin and occurrence, uses, production, list of producers, prices and new trends in utilization are among the different matters discussed in the bulletin.

Takes Charge of Universal Gypsum's Metal Lath Sales

J. A. PFEIFFER, formerly sales manager of the metal lath division of the Milcor Steel Co. of Milwaukee, Wis., has been appointed manager of the metal lath division of the Universal Gypsum and Lime Co. of Chicago, Ill.

The merchandising policies through retail dealers only will be carried out in the metal lath division. The present sales force of the Universal company will handle the sales of metal lath under the supervision of Mr. Pfeiffer and in cooperation with the company's several district sales offices.

The addition of metal lath to Universal's line is another step in the program of rounding out a complete service for lumber and building material dealers.

Concrete Paving Yardage

CONCRETE PAVEMENT yardage as awarded in the United States during April and for the period ending April 30 as reported by the Portland Cement Association follow:

	Yardage awarded— During April, 1932	To date, April 30, 1932
Roads	10,366,044	21,159,190
Streets	673,487	1,617,483
Alleys	48,250	95,404
Total	11,087,781	22,872,077

Fallacies About the Federal Budget

(An editorial in "The Constructor" of the Associated General Contractors of America)

ONE OF THE MOST ASTONISHING FALLACIES seems to have taken possession of Congress, the press and business leaders of the country. This is the sudden determination that the very life of the United States depends upon the balancing of the federal budget at once. Of course, Congress has had a budget for very few years and may not be used to it yet. Business leaders have had budgets, however, and should be fairly familiar with them and the principles on which they are based.

Yet the April economic review of the National City Bank states: "If the experience of the depression has demonstrated anything conclusively, it is that capital will flee a country which does not balance its budget."

Silas H. Strawn, president of the Chamber of Commerce of the United States, summarized the views of members of that organization in a recent release, stating: "Twelve hundred associations of business men, from coast to coast, have declared in no uncertain terms their desire that the government take immediate steps to produce a balance of expenditures and revenues."

One could go on quoting indefinitely.

So great has been the hysteria about the budget that it was only in the latter part of April that a few senators awakened to the idea that there is no point in requiring that the year's expenditures for new permanent improvements, which are to last for from 50 years to a century, must all be paid for out of the year's income. Said Senator Vandenberg of Michigan: "We build a four million dollar postoffice in the city of Detroit this year which will undoubtedly stand for 50 years, and yet we charge the entire 50-year investment to the harassed taxpayers in the current tax year." The senator points out that Henry Ford would not only not keep his accounts like that but would not be allowed to do so in computing his income and expenditures for tax purposes.

Senator Copeland of New York states: "We have over here the House Office Building, a magnificent building. We have the Supreme Court chambers being erected. Why should the taxpayers this year pay for those items when they will be used for 25, 50 or 100 years?"

There are approximately $377,000,000 in the federal budget on account of permanent improvements of this character. Not only is there no justification for determining that they must be paid out of the income this year or, failing such income, that the items be slashed, but it is folly to do so. Take but one example, the appropriation for construction of Hoover Dam.

The estimate of the Budget Bureau for the year was $10,000,000. The House cut it to $8,000,000. The Senate slashed it to $6,000,000. This will require a curtailment of nearly 50% in the scheduled activities at the dam. Who loses? Why, the United States Government. It has millions already tied up in the dam. It will begin to secure revenue from power contracts only when the dam is finished. At present the contractors have the dam nearly a year ahead of schedule; this appropriation cut will lose that year's power income for the government and, in addition, will cost the amount of one year's interest on moneys that will be tied up in the dam during that last year. The cut in the appropriation will cost the government a large proportion of the sum slashed off the budget. The same principle holds true of practically all the other slashes that are being made on appropriations for other projects under way. Certainly the proposal to separate these items out of the budget and to provide for them intelligently is an essential move.

Budget Hysteria

However, that is not the major point in the hysteria that has prevailed over the whole question of getting a balance. It seems to be forgotten that the United States never had a budget during the course of previous depressions. The Federal Budget was created by the act approved June 10, 1921. This is its first major depression. In its short life it has seen $10,000,000,000 of the national debt retired. How was that debt contracted? Not by balancing expenditures against income during the emergency of the war.

Did capital fly the country or did twelve hundred associations of business men demand in no uncertain terms that expenditures must balance with income between the years 1917 and 1919? Of course the books and accounts of the federal government were kept on a different basis then. Perhaps now the more efficient bookkeeping system involved in budgeting operations has changed everything. If so, how lucky that there was no Federal Budget in the days when the Thirteen Colonies were struggling to give birth to this nation.

In every national emergency federal expenditures have been greater than the receipts. Only once and for a very short time, during the presidency of Andrew Jackson, was there no national debt. The only excuse for the existence of a national debt is to provide financing in cases of emergency. The question then seems to be, does the present economic condition of the country constitute an emergency or not?

Highway Construction Industries Plan Mass Meeting

ACTIVITIES of the American Road Builders' Association as reported to the annual meeting on April 28 have covered practically all highway activities. The association agreed to join with other groups interested in highways in a Construction Congress to be held this winter.

Work of the various divisions of the association during the past year shows a maximum degree of cooperative effort on a wide variety of subjects relating to road and street activities. Not only has this cooperation been with nationwide organizations such as the American Association of State Highway Officials, United States Bureau of Public Roads, the Associated General Contractors of America, and the United States Department of Commerce, but it has also included effective work with some 19 state associations of county officials and many municipal organizations. In 302 of the 374 cities of more than 25,000 population, intimate contact is maintained through representatives. In general engineering committee activities, cooperation was effected with a score of trade associations.

Sand and Gravel Producer Makes Asphaltic Road Material

OHIO Quartz Products Corp., a new Jackson, Ohio, industry, has begun the production of a new road-building material.

Harry Farrar, superintendent for the company, is an experienced road-builder and he has been active in perfecting the new product. Mr. Farrar was superintendent of state highways in the county for several terms.

The new product has been made up to meet all the specifications of the state highway departments, he states. The base of the mixture is Jackson county sand and gravel.

While the Ohio Quartz Corp. has not yet started operation of its brick plant, the sand and gravel pit has been the scene of considerable activity.—*Jackson* (Ohio) *Herald.*

Building Sand and Gravel Barges

AMONG the improvements underway this year in and about Warren, Penn., is that of the General Concrete Products Co., which will require the expenditure of several thousand dollars.

The company has under construction a steel barge 30x60x4½ ft. which will be used where the corporation may want to remove gravel and sand.

Before going into commission another craft of similar construction will be built for transporting the materials excavated.

The work on the barges and other equipment is being done by the Hammond Iron Works.—*Warren* (Penn.) *Times.*

The Mechanics of Credit Expansion

"TWELVE MONTHS AGO the all-important matter in banking was liquidity for the banker-depositor relation," writes Thomas F. Woodlock, in the *Wall Street Journal* (New York City). "Today that relation has dropped into the background. Bank failures have virtually ceased and so has the hoarding of cash. Now the emphasis is upon the banker-borrower relation and the effort is to get bank credit to work. This is admittedly the aim of the Federal Reserve policy which has forced credit into the bank reservoirs to such an extent as to reduce member bank borrowings to a low figure, and to furnish the New York banks, for example, with large 'surplus reserves.' The object is to expand the use of this credit as fast as possible and by its expansion start the commodity price level on an upward course.

"Here we strike what seems to be a closed circle of causes and effects," continues Mr. Woodlock. "No one will borrow credit unless he can see a way to make it earn a profit; the drop in commodity prices has largely destroyed profits; commodity prices will go up only when demand arises; demand arises only when people see a possible profit, and so we go around the circle. The hope of the Federal Reserve Board is that this circle will be breached somewhere by the rising tension of abundant credit acting as a species of explosive. It is a reasonable hope, justified by experience in the past, but it needs to be tempered by patience.

"In times like these it is easy to blame the banker for over-caution. Remembering the agonizing experience through which he has passed so recently, it is but natural that the mood of caution should linger after the danger has passed. Also in times like these it will commonly be found that demand for credit comes not so much from those who are of the 'desirable borrower' class (for these are apt to have little desire to borrow), but from those whose claims to credit are less impressive. Thus, it is not so easy for the banker as it looks to set his abundance of available credit to work at once in channels involving the use of material for manufacture and distribution. Meantime, it piles up in the form of securities of the highest class and commodity prices remain unaffected. The circle has not yet been breached nor is it easy to see how long we must wait for the breach. But there is nothing else to do."

Equips Crushed Stone Plant

THE Kansas City Material Co., Kansas City, Mo., is building a stone crushing and washing plant of 2000 tons daily capacity. It will also be equipped to strip 100 cu. yd. per hr. hydraulically. The plant will be operated with Diesel power.

Enforces Royalty on Sand and Gravel for Road Work

A ROYALTY of 3c. per cu. yd. will be charged by the state of Oregon for sand and gravel taken from navigable streams for highway construction purposes, it was decided by the state land board recently.

Up until last fall the royalty on sand and gravel for highway purposes was waived by the land board. At that time the maximum royalty of 10c. per cu. yd. was assessed against all sand and gravel coming under the jurisdiction of the board regardless of its destination. Members of the state highway commission protested against the charge because of its effect on owners of private gravel beds from whom the state is compelled to purchase most of its supply.

It is estimated that the 3c. royalty will return between $3000 and $4000 to the land board this year. The money goes to the credit of the irreducible school fund and is apportioned among the schools on the basis of enrollment.

Sand-Lime Brick Production and Shipments in April

THE FOLLOWING DATA are compiled from reports received direct from 19 producers of sand-lime brick, located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Nineteen sand-lime brick plants reported for the month of April, this number being four less than the number reporting for the month of March, statistics for which were published in our issue of April 23. Figures for the month of April indicate an increase in production and rail and truck shipments. Stocks on hand remain about the same, while unfilled orders show a decrease.

Average Prices for April

Shipping point	Plant price	Delivered
Detroit, Mich.	.....	$12.50
Flint, Mich.	$10.99	12.50
Grand Rapids, Mich.	10.00	.....
Jackson, Mich.	13.00	.....
Menominee, Mich.	9.50	12.00
Milwaukee, Wis.	8.00	11.00
Minneapolis, Minn.	7.50	.....
Pontiac, Mich.	10.50	12.50
Saginaw, Mich.	11.00	.....
Syracuse, N. Y.	18.00	20.00
Toronto, Ont., Can.	11.40	13.50

Statistics for March and April

	†March	*April
Production	1,603,155	2,501,990
Shipments (rail)	125,275	354,500
Shipments (truck)	2,088,876	2,575,490
Stocks on hand	8,421,283	7,264,338
Unfilled orders	8,914,000	5,430,000

†Twenty-three plants reporting, incomplete, one not reporting production and six not reporting unfilled orders. *Nineteen plants reporting; incomplete, one not reporting stocks on hand, and seven not reporting unfilled orders.

Notes from Producers

Paragon Plaster Co., Syracuse, N. Y., is supplying sand-lime brick for the Syracuse Light Co. Service Bldg., and the Sioux Falls Pressed Brick Co., Sioux Falls, S. Dak., write that they are furnishing 300,000 brick for the City Coliseum there, the brick to be used for inside backing up.

RETAIL MATERIAL PRICES, DELIVERED, APRIL 1, 1932 (COMPILED BY DEPARTMENT OF COMMERCE)

City	Portland cement, per bbl. exclu. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
New Haven, Conn.	$2.40	.....	$25.00	$1.25	$2.00	.....
New London, Conn.	2.05	25.00	18.00	1.50	3.00	$18.00
Waterbury, Conn.	2.60	30.00	18.00	1.10	2.45	18.00
Haverhill, Mass.	2.40	25.00	16.00	.....	.....	17.50
New Bedford, Mass.	2.45	24.00	16.50	1.50	2.75	16.50
Buffalo, N. Y.	2.95	21.00	18.00	2.50	2.05	16.00
Poughkeepsie, N. Y.	1.95	.....	26.00	2.25	2.20	13.00
Rochester, N. Y.	2.28	22.00	14.50	2.25	2.40	16.00
Syracuse, N. Y.	2.60	20.00	.....	1.80	1.60	14.00
Paterson, N. J.	2.00	24.00	18.00	1.50	2.10	[illegible]
Trenton, N. J.	2.10	23.00	13.50	1.60	1.50	16.50
Philadelphia, Penn.	2.10	.....	13.75	1.75	2.60	16.50
Scranton, Penn.	2.40	.....	20.00	3.25	.....	19.00
Baltimore, Md.	2.10	25.00	13.00	1.85	2.50	15.50
Washington, D. C.	1.65	22.50	12.00	.....	.....	14.00
Richmond, Va.	2.90	.....	21.00	1.65	2.10	18.00
Fairmont, W. Va.	2.60	35.00	16.00	2.70	3.25	18.00
Columbia, Tenn.	2.32	22.00	12.00	1.37	2.75	16.60
Atlanta, Ga.	2.55	36.00	15.50	2.81	2.50	20.15
Tampa, Fla.	2.40	.....	24.00	2.00	3.50	.....
Birmingham, Ala.	4.00	.....	.....	3.00	.....	.....
New Orleans, La.	2.35	37.20	14.00	2.75	.....	18.00
Shreveport, La.	2.30	38.00	9.40	1.40	2.40	20.00
Akron, Ohio	$1.81	$20.00	$14.00	$1.50	$2.50	$15.50
Cincinnati, Ohio	2.40	25.00	14.00	2.36	2.50	.....
Cleveland, Ohio	2.00	.....	12.00	1.69	2.15	$18.00
Columbus, Ohio	2.00	.....	14.00	1.22	.....	16.00
Toledo, Ohio	1.40	20.00	12.00	1.40	1.60	14.00
Youngstown, Ohio	2.43	23.25	16.00	2.50	2.50	18.00
Detroit, Mich.	2.20	25.00	18.00	2.70	2.45	18.00
Lansing, Mich.	2.50	.....	20.00	1.80	1.80	17.50
Terre Haute, Ind.	2.00	28.00	18.00	1.25	3.00	18.00
Louisville, Ky.	1.86	.....	15.00	2.00	2.15	17.00
Milwaukee, Wis.	1.36	.....	22.00	1.10	1.10	22.00
Des Moines, Iowa	1.82	23.50	18.00	1.40	.....	14.00
Wichita, Kan.	1.75	25.00	22.50	1.00	.....	15.50
Kansas City, Mo.	1.90	25.00	22.00	1.60	1.88	17.00
St. Louis, Mo.	2.00	.....	16.00	1.35	1.65	16.00
St. Paul, Minn.	2.15	21.00	19.00	1.25	1.75	17.00
Grand Forks, N. D.	2.60	.....	28.00	2.60	.....	19.00
Sioux Falls, S. D.	2.00	40.00	22.00	1.25	2.00	15.00
Tulsa, Okla.	1.90	22.50	27.50	1.00	2.35	16.00
San Antonio, Tex.	2.41	39.00	20.00	2.00	2.00	19.15
Tucson, Ariz.	3.24	45.00	30.00	1.25	2.25	17.10
Los Angeles, Calif.	2.30	23.50	24.70	1.25	1.40	15.20
San Francisco, Calif.	.....	45.00	22.50	1.40	1.60	16.30

El Paso Plant Dedicates First Safety Trophy in 1932

ON FRIDAY, May 6, the El Paso, Tex., plant of the Southwestern Portland Cement Co. dedicated and unveiled its cast stone trophy, won for a perfect safety record during 1931. This is the first of the 1931 Portland Cement Association trophies to be delivered and dedicated. Max Koffman, secretary of the company, acted as master of ceremonies.

T. B. Warden, district engineer of the Portland Cement Asociation for Texas, made the formal presentation of the trophy for the Association.

The trophy was unveiled by Misses Mary Daniels and Roberta Meyers, daughters of the general foreman and the chief chemist. R. N. Tole, popularly known at the plant as "Old Man Tole, the Merry Old Soul," accepted the trophy on behalf of his fellow workers.

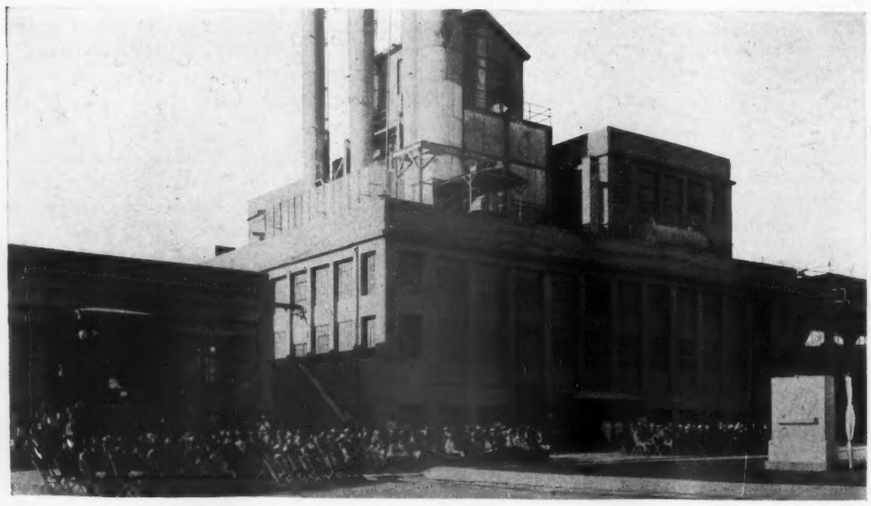
Following Mr. Tole's speech of acceptance, F. H. Powell, president of the company, delivered an inspiring message.

Major R. F. Burges, general counsel for the company at El Paso, also gave an excellent talk on the safety practices at the El Paso plant of the Southwestern company, reviewing the record from 1923 and prefacing his remarks with a description of the thought Carl Leonardt, the founder of the company, had during the construction of the plants of the company, that thought being construction of a type which would allow the men to work safely at all times.

Two representatives of the Victorville, Calif., plant of the company, Bill Montgomery and Jim Powers were present. Their duty on their return to the plant will be to report the ceremony and carry back enthusiasm to the force at Victorville. Both made stirring speeches.

Pedro Lopez of the plant organization, was asked to tell the Mexicans in the audience what he really thinks of safety work, and he talked to them in Spanish, giving them his ideas and stating that they should all do the best they could to perpetuate the record they had achieved.

Following the ceremony a barbecue meal was served to 500 employes and guests. The meal was prepared under the supervision of Mrs. H. E. Nichols and a committee of wives of plant employes.



Dedication of P. C. A. safety trophy at El Paso, Tex.

Federal Program of Roads Enlarged

A SUBSTANTIAL expansion in Federal-aid road projects approved for construction took place in April, the total estimated cost of the approved projects rising from $55,562,478 as of March 31 to $73,994,248 April 30, according to information made available May 14 at the Bureau of Public Roads, Department of Agriculture.

There was also a small increase in the projects actually under construction, according to the Bureau, showing that the road construction program still is holding at about the normal level. The following additional information was made available:

Bureau statistics show a steady reduction in the last three years in the average cost per mile of the road program. At the end of April, for instance, a mileage of roads materially larger than that under construction March 31, 1930, was being improved at a substantially lower total cost.

At the end of April, the program actually under construction called for improvement of 8,738.6 miles of road at a cost of $199,725,939, while the program under way on March 31, 1930, provided for construction of only 8,186.1 miles at a total cost of $211,430,846.

Average costs a year ago also were larger, the mileage as of March 31, 1931, having been 10,388.4 at a cost of $260,713,962—on account of the special $80,000,000 emergency appropriation.

The total mileage of federal-aid roads on which construction has been completed rose during April from 100,697.5 to 100,917. The estimated total cost of projects under construction advanced from $198,941,063 to $199,725,939. The mileage of roads under construction rose from 8,440 to 8,738.6 and the mileage approved for construction but on which work has not yet begun rose from 3,185.1 to 3,985.8.

The amount of federal-aid funds available for new projects was reduced during the month to $82,020,323 from $94,453,478 March 31.

Consider New Cement Plant in California

EASTERN FINANCIERS are considering expenditure of approximately $1,000,000 in construction of a 2500-bbl. cement plant north of Devore, Calif., it was revealed recently.

Engineers of a cement equipment company, acting as representatives of the capitalists, late last week inspected a 2200-acre tract near Devore, rich in limestone deposits and owned by a company composed for the most part of San Bernardino business and professional men.

C. E. Johnson, county sealer of weights and measures and trustee of the Security Portland Cement Co., owner of the tract, accompanied the engineers on the inspection trip. On their report is expected to determine whether or not the eastern capitalists form a company to take over the property. The property, about a mile and a half north of Devore station, is held by the San Bernardino company under mining claims. Dr. Steele Forsythe is president of the Security corporation.

Mr. Johnson was reticent regarding the development project and described plans as "highly tentative." He said it would cost about $1,000,000 to construct the type of plant which will be installed if the pending transaction is consummated.

The San Bernardino men acquired the property several years ago, and constructed a small manufacturing plant with a capacity of 200 bbl. daily. They turned out about 2000 bbl. of high grade cement, according to Mr. Johnson. Since that time the plant has been inactive.

There was a rumor on May 2 that the engineering reports on the tract already had been accepted, and that construction of the plant would start within 60 days. Mr. Johnson, however, denied this.

"So far as I know," he said, "the financiers have not even formed a company as yet."—*San Bernardino* (Calif.) *Sun.*

Conservation Committee of Cement Association Lunches Under Kiln

ON APRIL 20 the Committee on Conservation of the Portland Cement Association made a trip of inspection to the new kiln installation in the plant of the Canada Cement Co., Ltd., at Port Colborne, Ont., lunching under the kiln, which is the largest now in operation.

The committee members, who journeyed to Port Colborne after a meeting in Buffalo on the preceding day, were the guests of J. D. Johnson, president of the Canada Cement Co., Ltd.; S. Barr, chief engineer of the company, and L. M. McDonald, superintendent of the Port Colborne plant. The new kiln, which has been heralded as the world's largest piece of moving machinery, is 412 ft. 10 in. long and has a rated capacity of over 3000 bbl. per day. In the installation of the new kiln the plant was also changed over from the dry process to wet process and the four large kilns previously operated were put out of commission.

H. Osterberg and G. Larson, officials of F. L. Smidth and Co., New York, designers of the kiln, were present at the luncheon party and explained features in the new unit.

Among the guests present at the luncheon were the following: R. R. Bear, chairman of the Committee on Conservation of the Portland Cement Association and vice-president of the Lehigh Portland Cement Co., Allentown, Penn.; Raymond Wilson, secretary, Committee on Conservation, Portland Cement Association, Chicago; J. D. Johnson, president, Canada Cement Co.; S. Barr, chief engineer, Canada Cement Co.; J. Marstead, assistant engineer of the Canada Cement Co.; N. D. Colburn, general superintendent, Alpha Cement Co., Easton, Penn.; H. Haines, chief engineer, Alpha Cement Co.; J. F. Magee, plant manager, Alpha company; Marshall Beck, secretary-treasurer, Great Lakes Portland Cement Corp., Buffalo; A. T. Bevier, superintendent, Great Lakes Corp.; J. T. Zook, chief engineer, Great Lakes Corp.; J. S. Coffman, research engineer, Hercules Cement Corp., Philadelphia; C. H. Sonntag, plant manager, Lawrence Portland Cement Co., Thomaston, Me.; H. D. Baylor, vice-president, Louisville Cement Co., Speed, Ind.; H. S. Compton, chief engineer, Louisville Cement Co.; H. Vanderwerp, vice-president, Medusa Portland Cement Co., Chicago, Ill.; E. J. Maguire, vice-president and treasurer, Medusa company, Cleveland; W. L. White, assistant manager, Medusa company, Cleveland; E. Posselt, vice-president, International Cement Corp., New York; S. L. Dawson, chief engineer, Pennsylvania-Dixie Cement Corp., Nazareth, Penn.; W. P. Gano, assistant manager, Pennsylvania-Dixie Cement Corp., Nazareth, Penn.; Norman Johnson, superintendent, St. Mary's Cement Co., St. Mary's, Ont.; E. Burtt, chief engineer, St. Mary's; E. J. Carlson, chief engineer, Universal-Atlas Cement Co., Chicago; O. J. Binford, general manager, West Penn Cement Co., Butler, Penn.; R. J. Binford, chief engineer, West Penn Cement Co., Winfield, Penn.; G. A. Witte, assistant general manager, North American Cement Corp., Catskill, N. Y.; R. V. Young, chemical engineer, Allentown, Penn.; R. Newhouse, chief engineer, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; H. Osterberg, vice-president, F. L. Smidth and Co., New York; G. Larson, vice-president, F. L. Smidth and Co.; George R. Neilson, assistant engineer, F. L. Smidth and Co.; O. A. Larson, chief chemist, F. L. Smidth and Co.

Adopts $32,000,000 Road Program

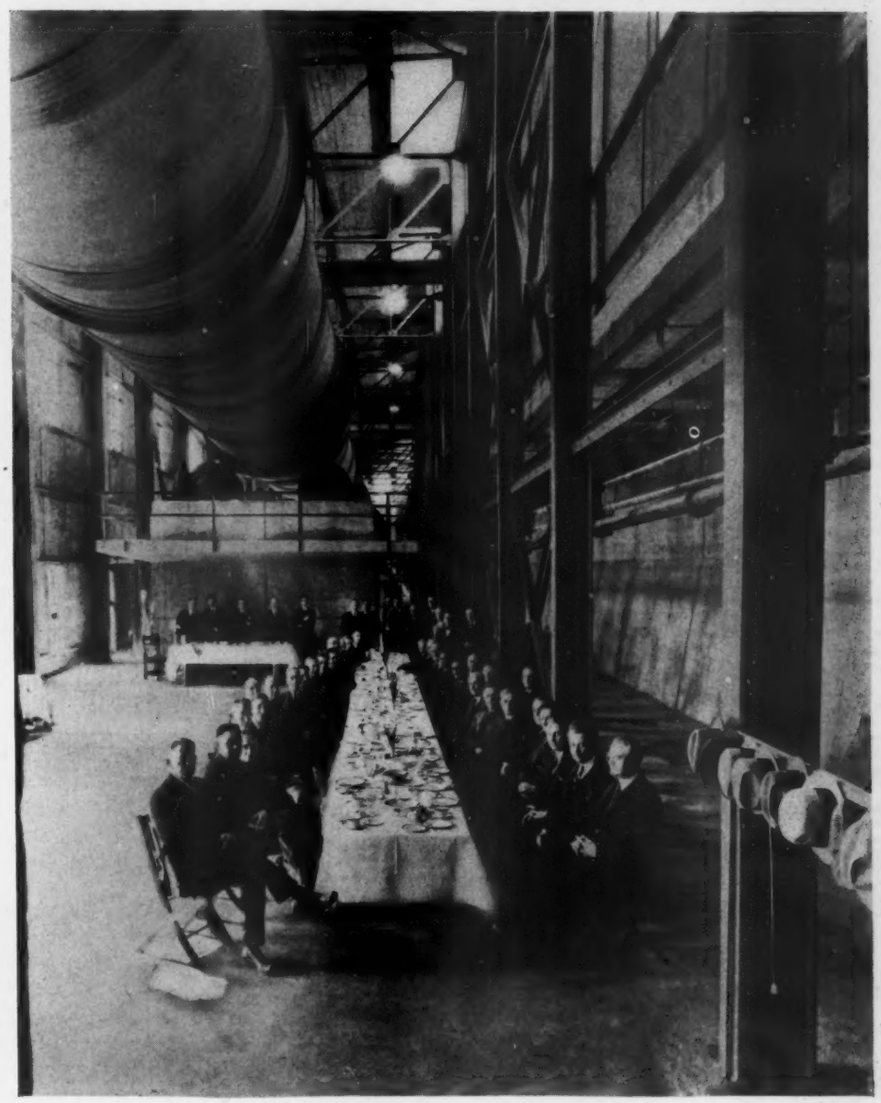
THE KENTUCKY state highway commission has adopted a budget calling for the expenditure of $32,000,000 for road construction during the next 24 months.

Consolidated Cement Corp. Has Fire

THE Cement City, Mich., plant of the Consolidated Cement Corp. was damaged by fire recently. The fire started in the packing house. More than 550,000 cloth and paper sacks burned. The company expects to fill all its orders and operate according to schedule. The main part of the plant was not damaged.—*Toledo* (Ohio) *Blade*.

Describes Medusa Campaign in Publication

A RECENT ISSUE of *Class and Industrial Marketing* described the campaign for modernization which the Medusa Portland Cement Co. has been running in recent weeks. A description of its advertising and the publications in which they are being run was given. Illustrations of advertisements were also shown.



Conservation Committee of the P. C. A. dining under huge new kiln of the Canada Cement Co., Ltd., Port Colborne, Ont.

News of All the Industry

Incorporations

Roadstone Quarries, Ltd., Vancouver, B. C., $25,000.

Point Grey Sand and Gravel, Ltd., Vancouver, B. C., $25,000.

Colorcrete Industries, Inc., Holland, Mich., 2500 shares of no par value.

Modern Cement Co., 26 Court St., New York City, 60 shares common. S. Y. Gitlin.

Niagara Lime Co., Buffalo, N. Y., $40,000. L. C. Gabriel, Buffalo. To produce cement, plaster, etc.

Amsterdam Crushed Stone Co., Inc., Amsterdam, N. Y., $20,000. Wm. J. Wallin, Katherine S. Wallin and Dominick Rocco.

Rock Ridge Silica Sand Co., Patton, Penn., $5000. John F. Prindible. To produce and deal in sand, stone and building materials.

Lannon Materials Corp., Lannon, Wis., 250 shares at $100 each. H. Behrens, H. Brum and K. Klasner. To deal in sand, gravel and building materials.

Midwest Material Co., Racine, Wis., 100 shares of no par value. Dr. E. J. Schneller, 3005 Wright Ave., Racine. Russell Frank and Charles Smith. To produce crushed stone, building materials, etc.

Quarries

Tom Carmody has moved his stone-crushing outfit from Egg Harbor to Sawyer, Wis.

J. W. Peters, Burlington, Wis., has installed a rock crushing outfit at his quarry near there.

Herman V. Irey is operating the Brady stone quarry in Richland township near Caledonia, Ohio.

H. J. Nichols Crusher Co. suffered loss to its buildings at plant in Kansas City, Mo., by fire started by vandals recently.

Platteville, Wis. The city council has ordered two stone quarries opened here. Crushed stone will be used in street improvement.

Oskaloosa, Ia. Workmen are stripping the quarry at the Ella Helm farm near Wright, Ia., to be operated by the county.

Marquette Stone Co., Marquette, Ia., organized ten years ago to operate a crushing plant there, recently declared its initial dividend of 6%.

Greensboro, N. C. A tentative agreement for purchase of the county rock quarry near Stokesdale by the R. G. Lassiter Co. is reported to have been reached.

Consolidated Rock Products Co., Los Angeles, Calif., is challenging legality of North Hollywood's title to property at a point north of Bradley street in the Roscoe district.

Prairie Center Rock Co., near Prairie Center, Kan., has been organized by Robert D. Kissick of Kansas City, Kan. A crusher has been installed and a storage bin completed.

St. Joseph, Mo. Stone to be used in surfacing a road near here will be obtained from a quarry on the J. B. Gibson farm. The county will contract to pay him 5c per cu. yd. for all stone used. M. J. Fern of Kansas City will install a crusher there and crush the rock for $1.35 per cu. yd.

Herkimer, N. Y. Much objection to purchase of a stone quarry by the county has developed since appointment of a committee to investigate purchase of the Newport stone quarry by the Board of Supervisors. A committee from the Women's Organization for National Prohibition has voiced its objection and a letter from P. B. McCaghney also registered protest.

Sand and Gravel

Dawes Construction Co. of Thomasville, Ga., is to operate a new sand plant there.

Wayne County Concrete and Sand Co., Honesdale, Penn., and its services were recently featured in an issue of *Honesdale Citizen*.

Percy H. MacDonald, who operates a sand and gravel business at Altmar, N. Y., has filed petition in bankruptcy listing liabilities $881.52 and no assets.

Jackson, Miss. A sales tax has been passed by the House of Representatives calling for a 2% tax on sand and gravel and crushed stone, with freight deducted.

Arundel Corp., Baltimore, Md., has been awarded a $3,500,000 contract from the Government for construction of the Livingston ship channel at Detroit, Mich.

Cooley Gravel Co., which operates a plant near Chillicothe, Mo., has installed new machinery at its plant there and is now shipping approximately 30 cars of gravel per day.

Kirkpatrick Sand and Cement Co., Birmingham, Ala., has added a retail lumber department to its business. A complete stock of rough and dressed lumber has been installed.

Cement

Alpha Portland Cement Co. was host to a group of Georgia Tech chemical engineers at its Birmingham, Ala., plant recently.

Union Portland Cement Co. recently blasted enough rock at its quarry at Devil's Slide, Utah, to supply the plant for nearly two years.

Cumberland Portland Cement Co. has closed the general sales office at Nashville, Tenn. E. W. Russell, sales manager, is no longer with the company. Sales for the time being will be handled from the plant office at Cowan.

Chicago, Ill. The following cement plants are among those which have recently opened or contemplate opening soon: the Arkansas Portland Cement Co.; the Gold Hill plant of the Beaver Portland Cement Co.; the Dewey, Okla., plant of the Dewey Portland Cement Co.; and the Bessemer Limestone and Cement Co.

Lehigh Portland Cement Co. has appointed R. M. Walker district sales manager at Richmond, Va. Mr. Walker served as sales manager of the Lone Star Cement Co. at Birmingham previously and as assistant sales manager for the Phoenix Portland Cement Co. when it was taken over by the International Cement Corp. in 1925.

Concrete Products

Akron Art Stone Co., Akron, Ohio, improved the method of installation of its cast stone burial vault.

Chicago and Suburban Concrete Block Association has been formed by a group of manufacturers in Chicago and Cook county, Ill.

Economy Concrete Products Co., Wauwatosa, Wis., recently furnished partition tile and back-up tile on a large junior high school in Milwaukee.

Ferris-Devine Co., Norwalk, Ohio, is to start manufacturing concrete blocks soon. A new building is being erected and equipment for production has been received.

Vermont Concrete Pipe Co., Inc., Montpelier, Vt., has installed considerable new equipment during recent weeks and is now turning out concrete pipe for highway and other construction work.

Miscellaneous Rock Products

Silica Products Co., Everton, Ark., is opening a sand pit and installing equipment there.

Wadley Asbestos Co., Inc., Dallas, Tex., is changing its name to Wadley, Inc., and amending its purpose of incorporation.

Standard Silica Co. has completed the structural steel work on its new plant near Ottawa, Ill. Three buildings are being constructed to replace the screening, storage and drying buildings which were destroyed by fire.

Personals

H. W. Bowen, traffic manager of the Rubber City Sand and Gravel Co., was recently elected president of the Traffic Study Club of that city.

H. J. Bryson, state geologist of North Carolina, recently reported that interest in the mineral wealth of North Carolina was steadily increasing.

Richard W. Smith, assistant state geologist of Georgia, recently was in Columbus, Ga., looking for deposits of mica and kaolin in that section of the state.

George S. Whyte, president, MacWhyte Co., Kenosha, Wis., was recently unanimously elected president of the city council, which position he has held for the past two years.

J. L. Herber of the International Cement Corp. recently addressed the Engineers' Society of Pennsylvania on economic facts pertaining to the use of high early strength cement.

James Thompson, chemist of the Thomaston plant of the Lawrence Portland Cement Co., described the manufacture of cement to the Augusta, Me., Rotary Club in detail.

W. F. Lackhardt has accepted a position with the Keystone Portland Cement Co. as manager of the technical department. He was formerly secretary-director, National Terra Cotta Society, New York.

J. S. Tritle has been elected vice-president in charge of operations of the Westinghouse Electric Supply Co. He will assume his new duties in addition to his present position as vice-president and general manager of the Westinghouse Electric and Manufacturing Co.

Obituaries

A. Leo Leiweke, 53, president-treasurer of the Centaur Lime Co., Centaur, Mo., was recently killed when a train struck the car in which he was riding. His daughter, a niece and a nephew were also killed.

John D. Toll, editor of the *American Fertilizer*, died at his home in Philadelphia, April 22, following an illness of several months. Mr. Toll started with the *American Fertilizer* in 1894 and was the first and only editor of that publication. He had been very active in promoting the development and acceptance of fertilizers.

Manufacturers

Atlas Car and Manufacturing Co., Cleveland, Ohio, announces that it is now represented in Canada by McCarthy and Robinson, Ltd., with offices at Toronto, Ont., Montreal, Que., and Kirkland Lake, Ont., Canada.

Harry C. Collins Machinery Co., Los Angeles, Calif., has been appointed distributor in Los Angeles and adjacent territory for the shovel and crane division of Link-Belt Co., Chicago. Mr. Collins was previously with the Link-Belt Co.

Traylor Engineering and Manufacturing Co., Allentown, Penn., announces the new location of its Chicago office is One La Salle Street Building. Bernard Haislip, former district manager, has resigned and is succeeded by D. A. Cheyette, who comes from the New York office, where he was assistant district manager.

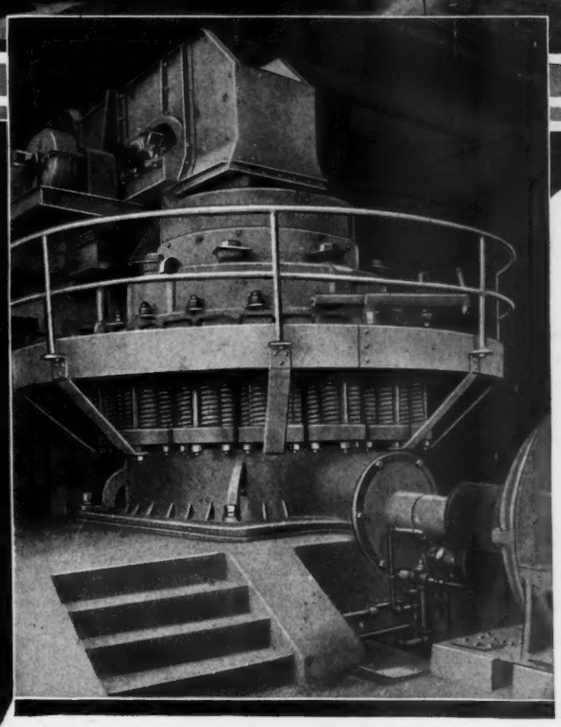
D. A. Cheyette

Morris Machine Works, Baldwinsville, N. Y., announces its Cleveland office has been removed to Western Reserve building.

Sterling Motor Truck Co., Milwaukee, Wis., announces a decided improvement in sales in April, with more unfilled orders on hand than in any similar period since the spring of 1930.

Productive Equipment Corp., Chicago, Ill., announces appointment of H. E. Epley, Detroit, Mich., as representative in Michigan to handle sales of Jigger vibrating screens. Feenaughty Machinery Co., Portland, Ore., has been appointed sales agent in the states of Washington, Oregon and Idaho. E. R. Gale, Jr., Louisville, Ky., has been appointed sales representative for Kentucky and part of Indiana.

AMERICA'S OUTSTANDING ROCK CRUSHING PLANT USES SYMONS CONE CRUSHERS



One of two 7 foot Symons Cone Crushers, which do all the secondary crushing at the Clinton Point Plant. At the Haverstraw Plant, two 4 foot Symons Cones are also in service.

MODERN to the last detail. This new crushing plant of the New York Trap Rock Company at Clinton Point, New York, is outstanding not only because of its capacity, but because of the many new ideas that have been incorporated into its design and construction.

For this, like most modern crushing plants built in recent years, Symons Cone Crushers were selected for the secondary crushing. That Symons Cones should consistently be chosen by those of wide experience and in a position to appreciate their merits, is ample proof of why they lead in the reduction crushing field today.

There is no need to take chances with your reduction crushing operations. Built in five sizes ranging from 2 to 7 foot diameters, there is a Symons Cone that will meet your requirements for capacity, give you a better product and reduce your crushing costs.

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